Scilab Textbook Companion for Solutions to Problems in Applied Mechanics by A. N. Gobby[1]

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Book Description

Title: Solutions to Problems in Applied Mechanics

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Scilab numbering policy used in this document and the relation to the above book.

Exa Example (Solved example)

Eqn Equation (Particular equation of the above book)

AP Appendix to Example(Scilab Code that is an Appednix to a particular Example of the above book)

For example, Exa 3.51 means solved example 3.51 of this book. Sec 2.3 means a scilab code whose theory is explained in Section 2.3 of the book.

Contents

List of Scilab Codes

Chapter 1

Linear Motion

Scilab code Exa 1.1 Velocity calculation

```
//Velocity calculation
clc
//initialisation of variables
t=20//ft
t1=30//ft
v=1320//ft/s
p=25//sec
q=15//ft/s
v1=v/t//ft/s
v2=v/t1//ft/s
T=(v2-v1)/p//ft/s^2
V=v2-q*-T//ft/s
V1=-V^2/(2*T)//ft/s
//RESULTS
printf('the velocity time is=%f ft/s',V1)
```

Scilab code Exa 1.2 Distance travel calculation

```
//Distance travel calculation
clc
//initialisation of variables
w=200//tonf
d=4//tonf
h=120//tonf
v=25//mile/h
m=10//lbf/tonf
q=2240//lbf
//CALCULATIONS
F=w*m//lbf
W=(w*q)*(1/h)//lbf
T=F+W//lbf
D=d*q//lbf
A=D-T//lbf
t=158.1//sec
T1=(v/2)*(88/60)*t//ft
//RESULTS
printf('Distance travel=%f ft',T1)
```

Scilab code Exa 1.3 velocity is uniform and force and velocity

```
//velocity is uniform and force and velocity
clc
//initialisation of variables
f=90//lbf
w=6//tonf
m=10//lbf/tonf
f1=1//min
h=0.8//hp
m1=m*w//lbf
n=f-m1//lbf
p=2240//lbf
f2=0.0715//ft/s^2
r=550//ft
```

```
//CALCULATIONS
S=1/2*f2*(m1)^2//ft
V=f2*m1//ft/s
H=(f*V)/r//ft
V1=h/(m1/r)//ft/s
//RESULTS
printf('the velocity is uniform and force and
   velocity=% f ft/s',V1)
```

Scilab code Exa 1.4 Tension Coupling calculation

```
//Tension Coupling calculation
clc
//initialisation of variables
w=30//tonf
m=100//tonf
w1=150//tonf
f=6000//lbf
h=2240//lbf
q=105//lbf
p=135//lbf
a=711.7//lbf
//CALCULATIONS
M=(q*h)/m//lbf
R=(w*h)/w1//lbf
T=M+R//lbf
A=f-T//lbf
T1=R+a//lbf
//RESULTS
printf('the Tension Coupling is=% f lbf',T1)
```

Scilab code Exa 1.5 work done ground resistance

```
clc
//work done ground resistance
//initialisation of variables
g=32.1//ft/s
w=3//tonf
p=16//ft
p1=6//in
h=2240//ft/cm^2
m=4//tonf
v=24.08//ft/s
//CALCULATIONS
K=(m*h*(v^2))/(2*g)//ft lbf
P=m*h*(1/2)//ft lbf
R=(K+P)/(h*(1/2))//tonf
//RESULTS
printf('the work done ground resistance=% 2f tonf',R
  )
```

Scilab code Exa 1.6 kinetic energy and velocity

```
//kinetic energy and velocity
clc
//initialisation of variables
p=50//ft/s
w=10//lbf
v=30//ft/s
w1=40//lbf
v1=20//ft/s
g=32.2//ft/s\
h=0.8//ft/s
V1=23.6//ft/s
V3=15.6//ft/s
V4=22//ft/s
//CALCULATIONS
V=(w+w1)/g/(w/g*v)+(w1/g*v1)//ft/s
```

```
V2=h*(-v1+v)//ft/s
K=(w*(v^2))/(2*g)+(w1*(v1^2))/(2*g)-(p*(V1^2))/(2*g)//ft /bf
K1=((w*(v^2))/(2*g))+((w1*(v1^2))/(2*g))-((w*(V3^2))/(2*g))-((w1*(V1^2))/(2*g))//ft lbf
//RESULTS
printf('the velocity of two bodies after impact is=%f ft/s',V4)
printf('final velocity is=%f ft/s',V2)
printf('Loss of kinetic energy at impact is=%f ft lbf',K1)
```

Scilab code Exa 1.7 equation of motion and acceleration

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//equation of motion and acceleration
clc
//initialisation of variables
d=4//ft
w=5//lbf
v=10//lbf
q=9.27//ft/s
//CALCULATIONS
W=w*d//ft lbf
P=v*d//ft lbf
M=(q)^2/d/2//ft/s^2
//RESULTS
printf('the equation of motion and acceleration=%f ft/s^2',M)
```

Scilab code Exa 1.8 maximum velocity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//maximum velocity of speed
clc
//initialisation of variables
a=30//degree
w=20//lbf
m=150//ft
v=18.6//ft/s^2
//CALCULATIONS
A=sqrt(m/(1/2)/v)//sec
V=sqrt(2*v*m)//ft/s
//RESULTS
printf('the maximum velocity of speed after=% f ft/s
   ',V)
```

Scilab code Exa 1.9 Work done against gravity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//Work done against gravity
clc
clear all
//initialisation of variables
r=1500//yd
w=200//tonf
v=25//lbf/tonf
V=56.8//ft/s
p=550//ft
t=80//ft
h=2240//ft/s
//CALCULATIONS
R=v*w//lbf
```

```
W=26.5*10^6//ft lbf
D=v*w*V//ft lbf
H=(v*w*V)/p//ft
W1=W/((v*w)*(w*h*1/180))*1000//ft
//RESULTS
printf('the Work done against gravity is=%f ft',W1)
```

Chapter 2

Angular Motion

Scilab code Exa 2.1 Motion speed and inertia

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//equation of motion, Mass of moment of inertia,
   percentage
//reduction in speed
//initialisation of variables
g=5//ft
w=300//rev/min
a=0.86//red/s^2
h=2240//ft/s
q=4//ft
g1=32.1//ft/s
k=3105000//ft lbf
//CALCULATIONS
T=(w*(2*%pi/60))/(a)//sec
M=(q*h*(g^2))/(g1)//slug ft^3
K=((1/2)*M)*((w*2*%pi^2)/(60))//ft lbf
W=sqrt(k/(1/2)/M)//rad/s
P=[(((w*2*%pi)/60)-W)/((w*2*%pi)/60)]*100//percent
```

```
//RESULTS
printf('The equation of motion=% f sec',T)
printf('Mass of moment of inertia of =% f ft lbf',K)
printf('the percentage reduction in speed=% f
   percent',P)
```

Scilab code Exa 2.2 radius of gyration

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//radius of gyration
//initialisation of variables
m=2.58065//slug ft^3
w=2.144//in
//CALCULATIONS
R=sqrt(m/w)//ft
//RESULTS
printf('The radius of gyration=% f ft',R)
```

Scilab code Exa 2.3 distance travelled along incline

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//distance travelled along incline before coming to
   rest
clc
//initialisation of variables
w1=10//tonf
r=36//in
w=1/4//tonf
```

```
g=14//in
t=30//mile/h
s=100//in
m=20//lbf/tonf
h=2240//lbf
q=44//in
g1=32.2//ft
//CALCULATIONS
K=(w1*h*(q^2))/(2*g1)//ft lbf
L=q/1.5//rad/s
R=(2*1/2*(1/4*h/g1)*(g/12)^2)*L^2//ft lbf
T=K+R//ft lbf
M=m*w1//lbf
G=w1*h*(1/s)//lbf
S=K/(M+G)//ft
//RESULTS
printf('the distance travelled along incline before
   coming to rest=% f ft',S)
```

Scilab code Exa 2.4 percentage fluctuation

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//percentage fluctuation in speed
//initialisation of variables
g=32.2//ft
p=275//rev/min
w=1/2*p//ft
d=15//hp
h=33000//ft
r=0.8//ft
h1=2240//ft
m=p*(2*%pi/60)//rad/s
```

```
//CALCULATIONS
W=(d*h)/w//ft lbf
E=r*W//ft lbf
I=(1*h1*(3)^2)/(g)//slug ft^2
Q=(E*100)/(I*(m)^2*2)//percent
//RESULTS
printf('the percentage fluctuation in speed=%f
    percent',Q)
```

Scilab code Exa 2.5 frictional torque in stopping flywheel

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//weight of flywheel and the work done by frictional
     torque
//initialisation of variables
w=140//rev
r=8//in
g=12//in
t=30//mile/h
q=(1/4)//tonf
I=0.99//slug ft^3
p=32.2//ft^2
//CALCULATIONS
W=(I*p)/(r/g)^2//lbf
T=(I*(2*%pi)^2)/(2*(2*%pi)*w)//lbf ft
//RESULTS
printf('The weight of flywheel=%f lbf',W)
printf('the work done by frictional torque in
    stopping flywheel=%f lbf ft',T)
```

Scilab code Exa 2.6 Kinetic energy and force

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//mass moment of inertia , kinetic enrgy and shear blades
clc
//initialisation of variables
w=2//tonf
t=250//rev/min
g=32.2//ft
h=2240//ft
f=0.8//percent
t1=60//ft
s=1*(2/3)//min
r=480//ft
w1=20//ft
//CALCULATIONS
M=(w*h*(w^2))/g//slug ft^2
A=(t*(w*%pi/t1))/t1*s//rad/s^2
I=M*A//lbf ft
K=1/2*(M)*(2*%pi/t1)^2*r*w1//ft lbf
F=f*K/(3/12)//lbf
//RESULTS
printf('the mass moment of inertia =%f lbf ft',I)
printf('the kinetic energy=%f ft lbf',K)
printf('the average force on the shear blades=%f lbf',F)
```

Scilab code Exa 2.7 tangential braking acting

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
```

```
clc
//frictional torque retarding and tangential braking
    acting
//initialisation of variables
h=2240//ft
w=0.06//ft
w1=4//ft
q=12//ft
g=5//ft
g1=32.2//ft
d=100//rev/min
f=120//sec
//CALCULATIONS
T=w*(w1*h)*(w1/q)//lbf ft
I=((w1*h*(g)^2)/g1)*d*(2*%pi/60)//slug ft^2/s or lbf
    ft s
M=I/T//sec
P=430.8//lbf ft
R=(P/2.5)//lbf
//RESULTS
printf('the frictional torque retarding=%f sec',M)
printf('the tangential braking acting=%f lbf',R)
```

Scilab code Exa 2.8 tangential force on brake

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//tangential force
clc
//initialisation of variables
I=179.2//lbf ft
h=2240//ft
w=4//ft
w1=5//ft
```

```
r=120//ft
g=32.2//ft
p=100//ft
t=60//ft
//CALCULATIONS
M=(w*h*(w1)^2)/g//slug ft^3
T=I/M//rad/s
D=p*(2*%pi)/(t*T)//sec
N=(p*(2*%pi)/t)/r//rad/s^2
T1=M*N//lbf ft
B=T1-I//lbf ft
F=B/2*1/2//lbf
//RESULTS
printf('the deceleration =%f sec',D)
printf('the tangential force on brake rim=%f lbf',F)
```

Scilab code Exa 2.9 friction of bearings is to to neglected

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//friction of bearings is to to neglected
clc
//initialisation of variables
h=2240//ft
g=32.2//ft
g1=15//in
w=1200//lbf
q=12//ft
r=1.5//ft
t=3.28//tonf ft
t1=1.7//tonf ft
x=550//ft
s=6//ft
```

```
//CALCULATIONS
T=((w*(g1/q)^2)/(h*g))*(3/r)//tonf ft
T1=t-t1+T//tonf ft
W=(T1*h*s/(r))/(x)//ft lbf
//RESULTS
printf('the friction of bearings is to to neglected
   =%f',W)
```

Scilab code Exa 2.10 torque to acceleration

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//torque to acceleration drum and truck
clc
//initialisation of variables
v=20//ft/s
s=150//ft
h=2240//ft
g=32.2//ft
d=3//ft
p=364.9//lbf
q=4//ft
//CALCULATIONS
A=v^2/(2*s)//ft/s^2
T=(h*(d)^2/g)*(A/q)+p*q//lbf ft
//RESULTS
printf('the torque to acceleration drum and truck=%
   f lbf ft',T)
```

Scilab code Exa 2.11 gravitational force

```
//Solutions to Problems In applied mechanics
```

```
//A N Gobby
clear all;
clc
//gravitational force
//initialisation of variables
v=35//hp
p=25//percent
v1=30//mile/h
q=28//in
d=30//in
w=3200//lbf
t=33000//lbf
s=88//in
W=w*(1/v1)//lbf
m=0.364//mile/h
//CALCULATIONS
N=(v1*s/60)/(14/12)*(60/(2*%pi))//rev/min
Ne=N*6//rev/min
E=(v*t)/(2*%pi*Ne)//lbf ft
T=(v*0.75*t)/(2*%pi*N)//lbf ft
P=T/(14/12)//lbf
V=sqrt((P-W)/m)//mile/h
//RESULTS
printf('the gravitational force=% f mile/h',V)
```

Chapter 3

Motion in a circle

Scilab code Exa 3.1 axis of rotation thus balancing the flywheel

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//axis of rotation thus balancing the flywheel
//initialisation of variables
w=2000//lbf
q=0.01//in
f=600//rev/min
r=18//in
g=32.2//ft^2
d=12//in
s=1.5//ft
//CALCULATIONS
F=(w/g)*(f*2*%pi/60)^2*(q/d)//lbf
W=w*(q/d)/s//lbf
//RESULTS
printf('the axis of rotation thus balancing the
   flywheel=% f lbf',W)
```

Scilab code Exa 3.2 speed and clutch will begin to transmit power

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
//speed and clutch will begin to transmit power and
   horsepower
clc
//initialisation of variables
w=4//lbf
r=60//lbf/in
d=13//in
g=32.2//in
p=500//rev/min
h=0.25//in
b=5//in
q=1//in
f=62.2//lbf
V=31.1//rad/s
k=6.5//in
s=33000//ft
//CALCULATIONS
W=f/2//rad/s
F=(w*w/g)*(p*(2*%pi/r))^2*1/2//lbf
N=F-w*r//lbf
T=N*h*k/12//lbf ft
H=2*%pi*p*T/s//lbf ft
//RESULTS
printf('The speed and clutch will begin to transmit
   power =%f rad/s',W)
printf('the horsepower transmitted =%f',H)
```

Scilab code Exa 3.3 kinetic energy

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
w1=10//lbf
w2=5//lbf\
g=32.2//ft
h=8//ft
d=3//ft
v=10//lbf
q=15//ft
V=13.9//ft/s
//CALCULATIONS
M=(v*V+w2)/(v+w2)//ft/s
K=(v*(V)^2/(2*g))-(q*(M)^2/(2*g))//lbf
H=(q*(M)^2/(2*g))/q//ft
F=(v*(V)^2/(g*h))//lbf
T=F+v//lbf
//RESULTS
printf('The moment of bodies before impact=%f ft/s'
    ,M)
printf('The loss of kinetic energy in impact =%f ft
    /lbf',K)
printf('Gain in potential energy after impact =%f
    ft',H)
printf('tension in string centrifugal force weight=%
    f lbf',T)
```

Scilab code Exa 3.4 centrifugal force

```
//Solutions to Problems In applied mechanics
//A N Gobby
```

```
clear all;
clc
//initialisation of variables
w1=8//lbf
s=3//ft
m=35//lbf
g=32.2//ft/s
//CALCULATIONS
U=sqrt(g*s)//ft/s
T=w1+w1//lbf
P=m-w1//lbf
Umax=sqrt(P*g*s/w1)//ft/s
//RESULTS
printf('the centrifugal force=% f ft/s',Umax)
```

Scilab code Exa 3.5 tension in the string at position

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
w=3//lbf
v=5//ft
a=60//degree
g=32.2//ft
u=28.4//ft/s
t=25.4//ft/s
q=12//ft
p=1.5//ft
//CALCULATIONS
U=sqrt(g*v)//ft/s
T=w*(t)^2/(2*g)+w*cosd(a)//lbf
W=q+p//lbf
//RESULTS
```

```
printf('the tension in the string at position C=% f
    lbf',W)
```

Scilab code Exa 3.6 normal reaction

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
w=30//mile/h
r=500//ft
h=2240//ft
q=44//ft
t=(88/60)//ft
g=32.2//ft
//CALCULATIONS
Tan=(w*t)^2/(g*r)
W=h*cosd(Tan)+(h*(q)^2*sind(Tan))/(g*r)//lbf
//RESULTS
printf('the car and resolve forces normal and
    parallel to the slope=% f',Tan)
printf('the total normal reaction =% f lbf',W)
```

Scilab code Exa 3.7 centrifugal force

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
```

```
h=5//ft
h1=3//ft
r=200//ft
f=0.5//ft
v=60//ft/s
w=62.0//ft/s
q=1.5//ft/s
g=32.2//ft
//CALCULATIONS
V=sqrt(q)/(w/(g*r))/2//ft/s
F=sqrt(f*g*r)//ft/s
T=(v)^2/(g*r)//degree
//RESULTS
printf('The value of the speed=%f ft/s',V)
printf('The block is on the point of overturning =%
    f ft/s',F)
printf('the centrifugal force must just be equal to
    the frictional force=%f degree',T)
```

Scilab code Exa 3.8 equal moment of the centrifugal

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
w=20//cwt
q=3//ft
d=30//ft/ss
w1=4//ft
w2=6//in
h=2240//ft/s
g=32.2//ft
s=15//ft
f=4.5//ft
```

```
c=2.25//ft
//CALCULATIONS
T=(h*(d)^2/(g*s*q))//lbf
G=T*q//lbf ft
W=h*f/2//lbf ft
R=186.5//lbf
D=h-R//lbf
r=(q*h*d^2/(c*h)/g)//ft
//RESULTS
printf('the equal moment of the centrifugal force=%
    f ft',r)
```

Scilab code Exa 3.9 distance horizantal circle

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
l=3//ft
w=8//lbf
p=40//rev/min
q=6//ft
h=3.5//ft
g=32.2//ft
f=6//in
t=15.33//lbf
//CALCULATIONS
F=q/t//in/lbf
R=w*q/t//in
D=(h*w)/t*10//in
//RESULTS
printf('the distance horizantal circle=% f in',D)
```

Chapter 4

Simple Harmonic motion

Scilab code Exa 4.1 acceleration

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
t=3//sec
m=20//per mint
a=4//ft
//CALCULATIONS
T=2*%pi/t//ft/s
V=T*a//ft/s
F=(T)^2*a//ft/s^2
//RESULTS
printf('th acceleration x must be a maximum=% f ft/s
   ^2',F)
```

Scilab code Exa 4.2 simple pendulum

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
a=10//ft/s
x=1/12//ft/s
g=32.2//ft
//CALCULATIONS
P=2*%pi*sqrt(x/a)//sec
L=(P)/(2*%pi/sqrt(g))/2//ft
//RESULTS
printf('the simple pendulum =%f ft',L)
```

Scilab code Exa 4.3 maximum acceleration

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
w=20//lbf
p=12//ft/s
v1=15//ft/s
g=32.2//ft
v2=10//ft/s
d1=6//in
d2=9//in
a=10.82//in
//CALCULATIONS
Um=(v2*p)/sqrt(a^2-d2^2)//sec^-1
P=2*%pi/Um//sec
V=w*a//in/s
M=w^2*a/p//ft/s
F=(w/g)*M//lbf
```

```
//RESULTS
printf('the velocity=% f in',a)
printf('periodic time=% f sec',P)
printf('the maximum velocity=% f in/s',V)
printf('maximum acceleration=% f lbf',F)
```

Scilab code Exa 4.4 maximum acceleration

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
w=4//lbf
h=40//lbf/ft
d=2//in
g=32.2//ft/s
//CALCULATIONS
P=(d*%pi)*sqrt(w/(h*g))//sec
V=(d*%pi*d)/(P*12)//ft/s
M=(d*%pi/P)^2*(d/12)//ft/s
//RESULTS
printf('the period of vibration=% f sec',P)
printf('Maximum veloity=% f ft/s',V)
printf('Maximum acceleration=% f ft/s',M)
```

Scilab code Exa 4.5 kinetic energy

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
```

```
clc
//initialisation of variables
w=80//lbf
p=4//ft
d=20//stroke/min
d1=3//in
p1=0.6//sec
h=2//ft/s
g=32.2//ft/s
t=60//sec
//CALCULATIONS
P=t/d//sec
U=2*%pi/d1//sec^-1
V=U*sqrt(h^2-(3/4)^2)//ft/s
K=(w*V^2/(h*g))//lbf
M=U^2*h//ft/s^2
M1=(w/g)*M//lbf
D=h*cosd(U*0.6*180/%pi)//ft
D1=h-D//ft
//RESULTS
printf('the kinetic energy of the crosshead=%f lbf'
    ,K)
printf('the maximum acceleration of force on
    crosshead=%f lbf',M1)
printf('the distance from end of the path=%f ft',D1
    )
```

Scilab code Exa 4.6 velocity of acceleration

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
d=3//in
```

```
v=40//ft/s
a=3000//ft/s^2
p=5.31//in
//CALCULATIONS
U=sqrt(a/(d/12))//sec^-1
E=(U*60/(2*%pi))//rev/min
P=2/U//sec
W=U*(p/12)//ft/s
M=U^2*(p/12)//ft/s^2
//RESULTS
printf('the velocity of acceleration against time
    during one complete=%f ft/s^2',M)
```

Chapter 5

Mechanisms

Scilab code Exa 5.1 angular velocity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
r=120//rev/min
a=45//degree
d=1//ft
w=6//ft
q=3.96//ft/s
r1=7//ft
D=0.565//rad/s
W=28.0//ft
v1=12.6//ft
v2=22.4//ft
//CALCULATIONS
U=r*(2*%pi/60)*d//ft/s
a1=q/r1//rad/s
A=q/r1*W//ft/s
Vb=a1*W//ft/s
```

```
//RESULTS
printf('The velocity =% f ft/s',A)
printf('the angular velocity=% f ft/s',Vb)
```

Scilab code Exa 5.2 angular velocity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
a=13.25//in
q=4.5//in
b=9//in
r=2.5//in
w=6//in
s=2.4//in
x=8*3/4//in
y=4*3/8//in
z=5*3/4//in
R=0.81//ft/s
p=5.0//in
//CALCULATIONS
V=(2*%pi)*r//in/s
AB=(p/a)//rad/s
DE=s/b//rad/s
//RESULTS
printf('The angular velocity is=% f rad/s',AB)
printf('the angular velocity=% f rad/s',DE)
```

Scilab code Exa 5.3 angular velocity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
v=(60*2*%pi)/60*8/12//ft/s
x=8//in
y=12//in
c=4.76//in
b=4.13//in
e=10.0//in
w=12.0//in
f=3.55//in
q=6.08//in
k=1.95//in
h=2.35//in
//CALCULATIONS
V1=v*(c/b)//ft/s
V2=V1*(e/w)//ft/s
V3=V2*(f/q)//ft/s
K=V3*(k/h)//ft/s
F=f*(x/y)//ft
L=(F*y)/(f*x)//rad/s
//RESULTS
printf('the angular velocity length=%f rad/s',L)
```

Scilab code Exa 5.4 angular velocity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
d=60//rev/min
s=5//in
```

```
v=5//in/s
a=25.2//in/s
x=2.23//in
b=4.59//in
z=20.0//in
//CALCULATIONS
U=x*v//in/s
V=b*v//in/s
B=V/z//rad/s
//RESULTS
printf('the angular velocity=% f rad/s',B)
```

Scilab code Exa 5.5 angular velocity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
v=5//ft/s
f=0.5//in
e=5.27//in
w=1.98//in
k=2.96//in
x=1.7//in
h=3.4//in
i=7.2//in
d=0.76//in
Va=((200*2*%pi*1)/60)/7.75//rad/s
Vc=Va*i/k
//CALCULATIONS
F=f*v//ft/s
CE=(e*v)/4//rad/s
EF=w*v/3//rad/s
```

```
VCD=Va*i/k//rad/s
E=VCD*x/h//rad/s
V=E*d//ft/s
//RESULTS
printf('The velocity of F in=% f ft/s',F)
printf('The angular velocity of CE in=% f rad/s',CE)
printf('The angular velocity of EF=% f rad/s',EF)
printf('the velocity of link=% f rad/s',V)
```

Chapter 6

Strength of materials

Scilab code Exa 6.1 original length of bar

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
b=0.005//in
a=2//tonf
p=10//tonf
l=13500//tonf/in^2
//CALCULATIONS
x=(p/a)*b//in
E=(l*b*1/2)/a//in
//RESULTS
printf('the original length of bar =% f in',E)
```

Scilab code Exa 6.2 modulus of elasticity

```
//Solutions to Problems In applied mechanics
```

```
//A N Gobby
clear all;

clc
//initialisation of variables
p1=12000//in
p2=0.0125//lbf/in
x=8//in
w=14300//in
r=0.122//in
//CALCULATIONS
M=(p1/p2)*(x/(%pi/4*1^2))//lbf/in^2
P=0.1*x/100//in
S=w/(%pi/4*1^2)//lbf/in^2
P1=(r*100/x)//percent
//RESULTS
printf('the modulus of elasticity=% f lbf/in^2',M)
printf('non-proportional elongation=% f lbf/in^2',S)
printf('the percentage elongation=% f percent',P1)
```

Scilab code Exa 6.3 shear stress in fork

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
w=0.5//tonf/in^2
w1=7//tonf/in^2
w2=10//tonf/in^2
t=12.4//tonf/in^2
d1=1.5//in
d2=1.24//in
x=0.495//in
d3=3.02//in
```

```
//CALCULATIONS
Y=sqrt((d3/2)^2-(d2/2)^2)//in
S=(1/2*t/(2*Y*w))//tonf/in^2
//RESULTS
printf('the shear stress in fork end=%f tonf/in^2',S)
```

Scilab code Exa 6.4 resilience and modulus of elasticity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
g=2//in
t=0.002//in
l=7500//lbf
w=11000//lbf
p=1/4//in
//CALCULATIONS
W=1/2*l*t//in lbf
P=t*(w/l)//in
S=w/p//lbf/in^2
E=S*g/P//lbf/in^2
R=(1/2)*w*P//in lbf
//RESULTS
printf('The elongation at the elastic limit=%f in',P)
printf('The stress at the elastic limit=%f lbf/in^2',S)
printf('The modulus of elasticity E of the material is=%f lbf/in^2',E)
printf('The resilience and modulus of elasticity=%f in lbf',R)
```

Scilab code Exa 6.5 strain

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
v=4//in
w=20//tonf
d=10//ft
m=13400//tonf/in^2
q=2//in
l=120//in
//CALCULATIONS
Fmax=q*(w)/(%pi/v*v^2)//tonf/in^2
M=F*l/m//in
P=w*M//in tonf
//RESULTS
printf('The maximum instantneous stress=%f tonf/in
   ^2',Fmax)
printf('The maximum elongation is=%f in',M)
printf('the strain energy stored=%f in tonf',P)
```

Scilab code Exa 6.6 final stress after oscillation

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
```

```
d=4//in
p=2//ft
d1=1/2//in
e=13200//tonf/in^2
f=9.51//tonf/in^2
k=0.0114//tonf/in^2
//CALCULATIONS
E=k*f//in tonf
F=(p/(%pi/d*d^2))//tonf/in^2
//RESULTS
printf('the final stress after oscillation has died
    aways will load/area=%f tonf/in^2',F)
```

Scilab code Exa 6.7 corresponding stress

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
h=3//in
s=10.2//tonf/in^2
v=0.006//in
d=0.5//in
d1=0.75//in
w=20//lbf
q=v/8//tonf/in^2
x=0.029//in
//CALCULATIONS
M=s/q//tonf/in^2
E=M*(x)/(h*12)//tonf/in^2
//RESULTS
printf('the corresponding stress=%f tonf/in^2',E)
```

Scilab code Exa 6.8 total energy in the bar

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
e=30*10^2//lbf/in^2
b=15//in
t=50//percent
p=1.5//in
v=6//in
h=2240//lbf
I=0.0038//in
//CALCULATIONS
W=1/2*v*I//in tonf
w1=W*p//in tonf
T=sqrt((v^2*h)/(2*%pi/4*e))/((b)/(p)^2/(1)^2)*10//in
//RESULTS
printf('the total energy in the bar=% f in',T)
```

Scilab code Exa 6.9 the stress in the steel

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
clear
E=13400//tonf/in^2
E1=5600//tonf/in^2
h=7//tonf/in^2
```

```
h1=3.5//tonf/in^2
w=1.5//ij
l=5//tonf
A=%pi/4*1^2//in^2
A1=%pi/4*(w^2-1^2)//in^2
s=1.91//tonf
t=0.787//in
pg=1.72//tonf
//CALCULATIONS\
m=h*t//tonf
p=m/s//tonf
g=p/A1//tonf/in^2
m1=m+p//tonf
S=pg/A1//tonf/in^2
Ps=pg*s//tonf
S1=Ps/t//tonf/in^2
//RESULTS
printf('the stress in the steel=%f tonf/in^2',S1)
```

Scilab code Exa 6.10 column shortens

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
clear
E=2*10^6//lbf/in^2
s=600//lbf/in^2
w=12//in
l=80//tonf
w1=4//ft
E1=30*10^6//lbf/in^2
h=2240//in
s2=10.9//in^2
```

```
F=9000//lbf/in^2
//CALCULATIONS
L=(F*w1*w/E1)//in
//RESULTS
printf('the column shortens by=% f in',L)
```

Scilab code Exa 6.11 Final stress

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
clear
E1=30*10^6//lbf/in^2
E2=15*10^6//lbf/in^2
alf=6.4*10^-6//degF-1
alf1=9.5*10^-6//degF-1
t=170//deg
t1=50//deg
w=5//tonf
ec=0.000248//lbf/in^2
es=0.000124//lbf/in^2
h=2240//in
//CALCULATIONS
e=(alf1-alf)*(t-t1)//in
Ec=E2*ec//lbf/in^2
Es=E1*es//lbf/in^2
F=E1/E2//fc
S=w*h/(2*1+1)//lbf/in^2
S1=S*2//lbf/in^2
R=-Es+S//lbf/in^2
R1=Es+S1//lbf/in^2
//RESULTS
printf('The final stress in the steel and applied to
```

```
    the compound =% f lbf/in^2',R1)
```

Scilab code Exa 6.12 force calculation

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
a=1/16//ft/s
h=100//lbf/in^2
w=10//lbf/in^2
q=2//in
b=%pi/4*(3/16)^2//in^2
p=5//inch valu per 12.7
//CALCULATIONS
H=(h*w)/(q*a)//lbf/in^2
F=H*1*a//lbf
A=H/2//lbf/in^2
R=(b)/(F/A)*5.14*4//per inch
F1=A*1*a//lbf
m=(b)/(F1/A)*5.14//per inch
//RESULTS
printf('the force per inch of circumferential seam=%
    f per in',m)
```

Scilab code Exa 6.13 Diameter and pressure

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
```

```
clear
p=14.7//lbf/in^2
w=15000//lbf/in^2
p1=190//lbf/in^2
q=0.35//percent
q1=0.75//percent
w1=2//ft
q2=36//tonf/in^2
f=6//in
r1=3/8//in
p2=4//in
h=2240//in
//CALCULATIONS
A=w*q//lbf/in^2
E=w*q1//lbf/in^2
M1=(p2*A*(1/2)/(p1-p))//in
M2=(w1*E*(1/2)/(p1-p))//in
M3=p2*r1*((q2*h)/f)/(w1*12)//lbf/in^2 gauge
//RESULTS
printf('the Maximum possible diameter of cylinder =%f in',M2)
printf('the Maximum allowable pressure=%f lbf/in^2 gauge',M3)
```

Scilab code Exa 6.14 maximum rim speed of flywheel

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
clear
w=450//lbf/in^2
m=3000//lbf/in^2
g=32.2//lbf/in^2
```

```
h=144//in
//CALCULATIONS
M=sqrt(g*m*h/w)//ft/f
//RESULTS
printf('the maximum rim speed of flywheel=% f ft/f',
   M)
```

Chapter 7

Shear force and bending moment diagrams

Scilab code Exa 7.2 Load

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
R=24.4//tonf
x=9.7//ft
M=124//tonf ft
h=5//in
q=14//in
w=20//in
h1=6//in
p=3//in
g=10//in
//CALCULATIONS
Ra=h*q/w//tonf
Mc=Ra*h1//tonf ft
Rb=p*h1/w*q //tonf ft
RB=w*g-(2*g^2/2)//tonf ft
```

```
//RESULTS
printf('the tonf load alone=%f tonf ft',RB)
```

Scilab code Exa 7.3 Max bending moment

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
p=8//ft
h=2//tonf/ft
a=3//tons/ft
b=11//ft
w=b*h//tonf
//CALCULATIONS
S=(h*b^2/h)/p//tonf
R=w-S//tonf
x=R/h//ft
M=(R*x)-((h*(x^2))/h)//tonf ft
N=-(h*a^2/h)//tonf ft
//RESULTS
printf('the maximum bending moment occurs=%f tonf
    ft',N)
```

Chapter 8

Bending of beams

Scilab code Exa 8.1 bending moment

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
h=12//in
q=14//in
w=12500//in
p=2.5//in
m=0.067//in
t=2240//in
n=2.5*10^-5//in
//CALCULATIONS
R=(p*h*q)/(w)//in
I=(1*m^3/h)//in
M=((w*n)/(p*h)*t)//lbf in
//RESULTS
printf('the bending moment set up=%f lbf in',M)
```

Scilab code Exa 8.2 Stress

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
E=14*10^6//lbf/in^2
l=5.0//tonf/in^2
y=2*(1/4)//in
yc=4*3/4//in
n=2*1/2//in
p=1*1/4//in
q=2.25//in
I=55.25//in^4
m=10.56//tonf/in^2
a=(1*(yc^3))
b=6*(y^3)/3
c=(n*p^3)/3//in^4
//CALCULATIONS
INA=(a+b-2*c)*2//in^4
Fa=(l*yc)*(yc*y)/2//tonf/in^2
M=(l*INA/q)//tonf in
//RESULTS
printf('Thesecound moment of area about its neutral
    axis=% f in^4',INA)
printf('The maximum compressive stress on the
    section=% f tonf/in^2',Fa)
printf('the bending moment is=% f tonf in',M)
```

Scilab code Exa 8.3 rectangular plate

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
```

```
clc
//initialisation of variables
b=3*6^3/12//in^4
d=b+3*6*6^2//in^4
b2=%pi*2^4/64//in^4
h=b2+%pi*1^2*6^2//in^4
//CALCULATIONS
P=d-h//in^4
//RESULTS
printf('the rectangular plate with circular hole=% f
    in^4',P)
```

Scilab code Exa 8.4 Percentage increase

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
h=12//in
w=6//in
x=375.77//in^4
y=28.28//in^4
p=7//in
q=14//in
//CALCULATIONS
Ix=x+(p*q^3/h)-(p*h^3/h)//in^4
Iy=y+2*(1*p^3/h)//in^4
Zx=x/w//in^3
Zy=Ix/p//in^3
X=(Zy-Zx)/(Zx)*100//percent
//RESULTS
printf('the percentage increase in strength with
   respect to neutral=% f percent',X)
```

Chapter 9

Torsion of shafts

Scilab code Exa 9.1 shear stress

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
q=8000//lbf/in^2
r=9.25//in
G=12*10^6//lbf/in^2
t=1*%pi/180//rad
h=180//lbf ft
//CALCULATIONS
S=((G*%pi*r)/(q*h*2))//in
//RESULTS
printf('the shaft size and maximum shear stress=% f
   in',S)
```

Scilab code Exa 9.2 shaft diameter

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
a=600000//lbf in
b=%pi*(4)^4/32//in^2
q=4000//in^2
//CALCULATIONS
D=sqrt((a)/q)*2/b*10//in
//RESULTS
printf('The shaft diameter=% f in',D)
```

Scilab code Exa 9.3 maximum shear stress

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
h1=4//in
d=40//hp
w=30//rev/min
t=33*1/3//degree
h=33000//lbf ft
G=12*10^6//lbf/in^2
q=1.33//lbf ft
j=12//in
//CALCULATIONS
M=((h*d)/(2*%pi*w))//lbf ft
N=M*q//lbf ft
H=((N*j*h1*1/2)/(%pi*(h1)^4/32))//lbf/in^2
A=((j*N*j*180)/(%pi*(h1)^4/32*G*%pi))//degree
//RESULTS
printf('the maximum shear stress=% f lbf/in^2',H)
```

```
printf('the angle of twist=%f degree',A)
```

Scilab code Exa 9.4 Angle of twist

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
h=6//in
h1=4//in
d=5000//kilowatt
g=2500//rev/min
f=8//in
l=20//in
G=12*10^6//lbf/in^2
p=746//watts
w=1000//in
q=33000//in
j=102.2//in^4
t=12//in
k=180//in
//CALCULATIONS
S=(d*w/p)//hp
T=((q*S)/(2*%pi*g))//lbf ft
Q=(t*T/j)*3//lbf/in^2
F=f*Q//lbf/in^2
A=((t*T*l*h*k)/(G*j*%pi))//degree
//RESULTS
printf('the angle of twist=%f degree',A)
```

Scilab code Exa 9.5 Bolt diameter

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
d=7.5//in
m1=8000//lbf/in^2
m2=2000//lbf/in^2
h1=3//in
d1=2//in
d4=57//lbf in
W=2.74//lbf in
//CALCULATIONS
P=%pi*d1^4/32//in^4
M=(m1/1)*P//lbf in
T=M/(8*(d/d1))//lbf
A=T/m2//in^2
B=sqrt((4*A)/%pi)//in
//RESULTS
printf('the bolt diameter =% f in',B)
```

Scilab code Exa 9.6 Angular rotation

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
d=30//in
w=50//lbf ft
d1=10//in
G=12*10^6//lbf/in^2
T1=50//lbf ft
T2=16.7//lbf ft
```

```
J=4810//lbf ft
TA=w/3//lbf ft
Tab=w-TA//lbf ft
//CALCULATIONS
Ta=Tab-TA//lbf ft
Qmax=T3*G*(3/8)/(%pi/32)*(3/4)^4//lbf/in^2
M=(T3*12*d1)/(%pi/4*(3/4)^4*G)*(180/%pi)//degree
//RESULTS
printf('The couples required to hold the ends=%f
    lbf ft',Ta)
printf('The magnitude of the greatest shear stress
    set up in the shaft=%f lbf/in^2',Qmax)
printf('the angular rotation in degree of the
    section=%f degree',M)
```

Chapter 10

Force in plane framework

Scilab code Exa 10.3 resolving horizontally

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
l=2//units of length
a=sqrt(3)//degree
b=30//dgree
c=60//degree
v=1//length
Pc=1.154//tonf compressive
//CALCULATIONS
R=(v*l)/a//tonf
D=sqrt((R)^2+(v)^2)//tonf
T=41//degree
P=l*cosd(b)//tonf tensile
Pa=Pc*cosd(b)//tonf tensile
p=(l*cosd(b))/((1/2)+(Pc))/(1/2)//tonf compressive
//RESULTS
printf('the resolving horizontally =% f tonf
    compressive',p)
```

Scilab code Exa 10.4 Reaction

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
v=3//tonf
p1=6.0//tonf,compressive
p2=5.19//tonf,tensile
a=30//degree
b=60//degree
p3=7//tonf,compressive
//CALCULATIONS
P1=p2*sind(b)//tonf,tensile
P2=1/2*P1//tonf,compressive
P3=p1*cosd(a)-p3*cosd(b)//tonf,compressive
P4=P1*cosd(a)*sqrt(3)/P3//tonf,acting towards the
    left
R=P1*sind(a)//tonf,acting downwards
D=sqrt((P4)^2+(R)^2)//tonf
T=(R/P4)//to the horizantal
//RESULTS
printf('the direction reaction=%f to the horizantal
    ',D)
printf('the direction reaction =%f to horizantal',T
    )
```

Scilab code Exa 10.5 methods of sections in the force

```
//Solutions to Problems In applied mechanics
```

```
//A N Gobby
clear all;

clc
//initialisation of variables
R1=5//tonf
R2=7//tonf
P=5.77//tonf,compressive
m=11.56//tonf
a=30//degree
//CALCULATIONS
P=-sqrt(cosd(a)+m*sqrt(cosd(a))+2*0.5-R1*2)//tonf
//RESULTS
printf('the methods of sections in the force=% f
    tonf',P)
```

Chapter 11

Hydrostatics

Scilab code Exa 11.1 depth of centre of pressure

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
w=62.5//lbf
a=4*6//ft
x=4//ft
l=(6*6^3)/3-(6*2^3)/3//ft^3
q=24*x//ft^3
//CALCULATIONS
T=w*a*x//lbf
P=l/q//ft
//RESULTS
printf('the depth of centre of pressure=% f ft',P)
```

Scilab code Exa 11.2 depth of centre of pressure

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
a=60//degre
w=2.5//ft
x=3//ft
p=6*3//ft^2
h=62.4//ft
p1=3*6^3/12//ft^4
//CALCULATIONS
D=w+x*sind(a)//ft
T=h*p*D//lbf
P=p1*sind(a)^2/(p*D)+D//ft
//RESULTS
printf('the depth of centre of pressure=% f ft',P)
```

Scilab code Exa 11.3 trap door width

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
t=62.5*4*1//lbf
a=2/3*2//ft
m=62.5*4*(4/3)//lbf
f=500*2//lbf ft
T=((62.5*2*2)/2)*1/3*2//lbf
H=(62.5*2*1)//ft
//CALCULATIONS
H1=f/[H+T]*2/2.9///ft
//RESULTS
printf('the trap door width=% f ft',H1)
```

Scilab code Exa 11.4 moment of resultant force

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
g=6//ft
g1=50//ft
d=10//ft
w1=10//ft
w2=20//ft
w3=62.5//ft
t=w3*60*5//lbf
t2=8.37//tonf
t1=g1+t//lbf
H=26.4//ft
//CALCULATIONS
M=t*d/3//lbf ft
D=w3*w2*g*d//lbf
M1=D*(w2/3)//lbf ft
f=D-t//lbf
R=(M1-M)/f//ft
//RESULTS
printf('the moment of resultant force about gate
    base=% f ft',R)
```

Scilab code Exa 11.6 Moment of force

```
//Solutions to Problems In applied mechanics
//A N Gobby
```

```
clear all;

clc
//initialisation of variables
w=62.5//lbf/ft
w1=1.5//ft
d=4//ft
w2=3//ft
g=0.8//in
p1=2/3*w1//ft
q=2/3*p1//ft
//CALCULATIONS
t1=w1*w*w1/2//lbf
p=(g*w*p1*p1)/2//lbf
A=g*w*p1*1/2//lbf
T=(w*1/2*1/2/2)//lbf
P=t1-p-A-T//lbf
h=2.9*P/(t1*1-(p*2)/3-(p*(1*1/4))-(T*1.33))//ft
F=P*a/w1//lbf
H=F/2//lbf
//RESULTS
printf('depth of forces=%f lbf',F)
printf('the moment of force on hinge=%f lbf',H)
```

Chapter 12

Hydrodynamics

Scilab code Exa 12.1 bernouli s equation

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
p=144*60//lbf/ft^2
A1=1/4*%pi*(1/2)^2//ft^2
A2=1/4*%pi*(1/4)^2//ft^2
w=5//ft/s
U1=1/A1//ft/s
U2=1/A2//ft/s
g=32.2//ft/s
P=(U1^2/(2*g))+(p/(2*g))
P1=(3+U2^2/(62.4))+(144/(62.4))
//CALCULATIONS
Pb=(P/P1)*w//lbf/in^2
//RESULTS
printf('the bernouli s equation=% f lbf/in^2',Pb)
```

Scilab code Exa 12.2 Difference in feet of water

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
p=1.23//ft^2
t=0.197//ft^2
u=1.595//ft^2
g=13.56//ft^2
w=9.2//in
m=0.97//in
//CALCULATIONS
H=(g-1)*w/12//ft^2
Q=m*u*sqrt(H)//ft^3
S=Q*60*62.4/10//gallons/min
//RESULTS
printf('the head difference in feet of water=% f
    gallons/min',S)
```

Scilab code Exa 12.3 coefficients of discharge velocity and contraction

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;

clc
//initialisation of variables
h=4//ft
h1=3.24//ft^3/min
d=0.785//in
v=5.26//ft^3/min
//CALCULATIONS
Cd=h1/v//ft
```

```
C=1/4*%pi*(d)^2/(1/4*%pi*(1)^2)//ft^3
V=Cd/C
//RESULTS
printf('the coefficients of discharge velocity and
    contraction=%f',V)
```

Scilab code Exa 12.14 coefficient of velocity

```
//Solutions to Problems In applied mechanics
//A N Gobby
clear all;
clc
//initialisation of variables
x=32.5//in
y=33.7//in
h=8//in
//CALCULATIONS
C=sqrt((x)^2/(4*y*h))//ft
//RESULTS
printf('the coefficient of velocity=%f ft',C)
```