Scilab Textbook Companion for Engineering Economics by H. Agarwal[1]

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Book Description

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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

Time Value of Money

Scilab code Exa 1.1 Calculate compound interest

```
1  //Exa1
2  clc;
3  clear;
4  close;
5  //given data :
6  Vo=500;//in Rs
7  r=5;//in % per annum
8  i=r/100;
9  n=3;//in years
10 //formula Vn=Vo*(1+i)^n
11 V3=Vo*(1+i)^n;
12 disp(V3,"future value after three years : ")
13 CI=V3-Vo;
14 disp(CI,"compound interest is  : ")
```

Scilab code Exa 1.2 Calculate Doubling Time

```
1  //Exa2
```

```
clc;
clear;
close;
//given data :
i=6;//in % per annum
//we know rule of 72
disp("According to Rule of 72 : doubling period=72/(
    rate of interest)");
doublingperiod=72/i;
disp(doublingperiod,"Doubling period(in years) : ");


//we know rule of 69
disp("According to Rule of 69 : doubling period
    =0.35+69/(rate of interest)");
doublingperiod=0.35+69/i;
disp(doublingperiod,"Doubling period(in years) : ");
```

Scilab code Exa 1.3.a calculate compound value on yearly basis

```
//Exa3a
clc;
clear;
close;
//given data :
Vo=1000;//in Rs
r=12;//in % per annum
i=r/100;
t=3;//in years
//interest is calculated in yearly basis
n=t;
//formula Vn=Vo*(1+i)^n
Vn=Vo*(1+i)^n;
disp(Vn," The compound value (in Rs.) : ")
//The ans in the book is wrong
```

```
16 disp("Note : The ans in the book is wrong")
```

Scilab code Exa 1.3.b calculate compound value on quarterly basis

```
1  //Exa3b
2  clc;
3  clear;
4  close;
5  //given data :
6  Vo=1000;//in Rs
7  r=12;//in % per annum
8  i=r/100;
9  t=3;//in years
10 //interest is calculated in quarterly basis
11 n=4*t;
12 i=i/4;
13 //formula Vn=Vo*(1+i)^n
14 Vn=Vo*(1+i)^n;
15 disp(Vn," The compound value (in Rs.) : ")
```

Scilab code Exa 1.4 calculate compounded Amount

```
1  //Exa4
2  clc;
3  clear;
4  close;
5  //given data :
6  Vo=500;//in Rs
7  r=16;//in % per annum
8  i=r/100;
9  n=5;//in years
10 //interest is calculated in quarterly basis
11 m=4;
```

```
12 //formula Vn=Vo*(1+i/m)^(m*n)
13 Vn=Vo*(1+i/m)^(m*n)
14 disp(Vn," The amount will be(in Rs.) : ")
15 //Note: answer given in the book is not accurate
```

Scilab code Exa 1.5 calculate compounded amount received by child

```
1 //Exa5
2 clc;
3 clear;
4 close;
5 //given data :
6 Vo=5000;//in Rs
7 r=12;//in % per annum
8 i=r/100;
9 //On 6th year means amount deposited for 5 years
10 n=5;//in years
11 //interest is calculated in Half yearly basis
12 m=2;
13 //formula Vn=Vo*(1+i/m)^(m*n)
14 Vn=Vo*(1+i/m)^(m*n)
15 disp(Vn," After completing 5 years i.e, on its 6th
   year child will recieve(in Rs.) : ")
```

Scilab code Exa 1.6.1 Calculate Effective rate of interest compounding half yearly

```
1 //Exa 6(i)
2 clc;
3 clear;
4 close;
5 //given data :
6 r=9;//in % per annum
```

```
7  i=r/100;
8  //componding is done half yearly
9  m=2;
10 //formula EIR=(1+i/m)^m-1;
11 EIR=(1+i/m)^m-1;
12 %EIR=100*EIR;
13 disp(%EIR,"Half yearly EIR(in %) : ");
```

Scilab code Exa 1.6.2 Calculate Effective rate of interest compounding half quarterly

```
1  //Exa 6(ii)
2  clc;
3  clear;
4  close;
5  //given data :
6  r=9;//in % per annum
7  i=r/100;
8  //componding is done quarterly
9  m=4;
10 //formula EIR=(1+i/m)^m-1;
11 EIR=(1+i/m)^m-1;
12 %EIR=100*EIR;
13 disp(%EIR,"Quarterly EIR(in %) : ");
```

Scilab code Exa 1.6.3 Calculate Effective rate of interest compounding monthly

```
1  //Exa 6(iii)
2  clc;
3  clear;
4  close;
5  //given data :
```

```
r=9;//in % per annum
i=r/100;
//componding is done monthly
m=12;
//formula EIR=(1+i/m)^m-1;
EIR=(1+i/m)^m-1;
%EIR=100*EIR;
disp(%EIR,"Monthly EIR(in %) : ");
```

Scilab code Exa 1.7 Find out rate of interest

```
//Exa7
clc;
clear;
close;
//given data :
Vo=100;//in Rs
Vn=200;//in Rs
n=7;//in years
m=2;//for half yearly compounding
//formula Vn=Vo*(1+i/m)^(m*n)
//solving for i gives
i=m*(%e^((log(Vn/Vo))/(m*n))-1);
r=i*100;
disp(r,"The rate of interest(in % per annum) is    :
   ")
```

Scilab code Exa 1.8 Calculate future value

```
//Exa8
clc;
clear;
close;
```

```
5 //given data :
6 R1=5000;//in Rs
7 R2=10000;//in Rs
8 R3=15000;//in Rs
9 R4=10000;//in Rs
10 R5=8000;//in Rs
11 r=10;//in % per annum
12 i=r/100;
13 n=5;//in years
14 //formula Vn=R1*(1+i)^(n-1)+R2*(1+i)^(n-2)
     +.............+Rn-1*(1+i)+Rn
15 V5=R1*(1+i)^(n-1)+R2*(1+i)^(n-2)+R3*(1+i)^(n-3)+R4
     *(1+i)^(n-4)+R5;
16 disp(V5,"The future value of this series of payments
     (in Rs) will be : ")
```

Scilab code Exa 1.9 Calculate future value

```
1 //Exa9
2 clc;
3 clear;
4 close;
5 //given data :
6 A=1000;//in Rs
7 r=16;//in % per annum
8 i=r/100;
9 n=12;//in years
10 //formula FVA=(A*(1+i)^n-1)/i;
11 FVA=(A*((1+i)^n-1))/i;
12 disp(FVA,"The future value(in Rs.) is : ")
13 //Note: answer given in the book is not accurate
```

Scilab code Exa 1.10 Find the compounded Amount

```
//Exa10
clc;
clear;
close;
//given data :
r=6;//in % per annum
i=r/100;
//componding is done half yearly
m=2;
//formula EIR=(1+i/m)^m-1;
EIR=(1+i/m)^m-1;
//calculating FVA taking i=EIR;
//formula FVA=(A*(1+i)^n-1)/i;
A=100;//in Rs
n=18;//in years
i=EIR;
FVA=(A*((1+i)^n-1))/i;
disp(FVA,"Future Value of amount(in Rs) : ");
//Note: answer given in the book is not accurate
```

Scilab code Exa 1.11 Calculate present value

```
//Exa11
clc;
clear;
close;
//given data :
Vn=5000;//in Rs
r=10;//in % per annum
i=r/100;
n=5;//in years
//formula for present value Vo=Vn/(1+i)^n
Vo=Vn/(1+i)^n;
disp(Vo,"Present value is: ")
```

Scilab code Exa 1.12 Calculate how much amount should be deposited today

```
1  //Exa12
2  clc;
3  clear;
4  close;
5  //given data :
6  Vn=15000;//in Rs
7  r=12;//in % per annum
8  i=r/100;
9  n=5;//in years
10 m=2;//for half yearly compounding
11 //formula EIR=(1+i/m)^m-1;
12 EIR=(1+i/m)^m-1;
13 //formula for present value Vo=Vn/(1+i)^n
14 //taking i=EIR;
15 i=EIR;
16 Vo=Vn/(1+i)^n;
17 disp(Vo,"Present value is: ")
```

Scilab code Exa 1.13 Calculate borrowed sum

```
1  //Exa13
2  clc;
3  clear;
4  close;
5  //given data :
6  R1=676;//in Rs
7  R2=676;//in Rs
8  r=4;//in % per annum
9  i=r/100;
```

```
10 n=2;//in years
11 //formula for present value of series payments V0=R1
      /(1+i)^(1)+R2/(1+i)^(2)+..
12 Vo=R1/(1+i)^(1)+R2/(1+i)^(2);
13 disp(Vo,"The borrowed sum is : ")
```

Scilab code Exa 1.14 Calculate present value of a series of unequal cash-flows

```
1 //Exa14
2 clc;
3 clear;
4 close;
5 //given data :
6 R1=5000;//in Rs
7 R2=10000;//in Rs
8 R3=10000;//in Rs
9 R4=3000;//in Rs
10 R5=2000;//in Rs
11 r=10;//in % per annum
12 i=r/100;
13 n=5;//in years
14 //formula for present vlue of series payments PV=R1
      /(1+i)^(1)+R2/(1+i)^(2)+.............+Rn/(1+i)^n;
15 PV=R1/(1+i)^(1)+R2/(1+i)^(2)+R3/(1+i)^(3)+R4/(1+i)
      ^4+R5/(1+i)^5;
16 disp(PV,"Present value is: ")
```

Scilab code Exa 1.15 Calculate ammount of each instalment

```
1 //Exa15
2 clc;
3 clear;
```

```
4 close;
5 //given data :
6 Vo=20000;//in Rs
7 r=4;//in % per annum
8 i=r/100;
9 n=10;//in years
10 //formula for annuity can be determined by Vo=(A
     *((1+i)^n-1))/(i*((1+i)^n));
11 A=(Vo*(i*((1+i)^n)))/((1+i)^n-1)
12 disp(A,"The amount of each investment(in Rs) is : ")
13 //Note: answer given in the book is not accurate
```

Scilab code Exa 1.16 Calculate annual payment

```
1 //Exa16
2 clc;
3 clear;
4 close;
5 //given data :
6 Vn=500000;//in Rs
7 r=10;//in % per annum
8 i=r/100;
9 n=5;//in years
10 //Formula for needed annual payment R=(Vn*i)/((1+i)^
     n-1);
11 R=(Vn*i)/((1+i)^n-1);
12 disp(R,"Required value(in Rs) : ")
13 //Note: answer given in the book is not accurate
```

Scilab code Exa 1.17 Calculate size of instalment

```
1 //Exa17
2 clc;
```

```
clear;
close;
//given data :
Vo=200000;//in Rs
r=8;//in % per annum
i=r/100;
n=5;//in years
//Formula for size of installment can be calculated
   by Vo=(A*((1+i)^n-1))/(i*(1+i)^n);
A=(Vo*(i*(1+i)^n))/((1+i)^n-1);
disp(A,"Required value(in Rs) : ")
//Note: answer given in the book is not accurate
```

Chapter 2

Simple and compound interest

Scilab code Exa 2.1 Calculate compound interest

```
1 //Exa1
2 clc;
3 clear;
4 close;
5 //given data is :
6 P=10000;//in rupees
7 n=3;//in years
8 r=10;//% per annum
9 A=P*(1+r/100)^n;
10 CI=A-P;//in rupees
11 disp("Compound interest is : "+string(CI)+" Rupees."
   )
```

Scilab code Exa 2.2 Find compound interest

```
1 //Exa2
2 clc;
3 clear;
```

```
close;
//For first year
P1=500;//in rupees
n=3;//in years
r=10;//% per annum
T=1//in year
I1st=(P1*r*T)/100;
A1=P1+I1st;
//For second year
P2=A1;
I2nd=(P2*r*T)/100;
A2=P2+I2nd;
//For third year
P3=A2;
I3rd=(P3*r*T)/100;
A3=P3+I3rd;
//compound interest or 3 years
CI=A3-P1;
disp("Compound interest is : "+string(CI)+" Rupees."
   )
```

Scilab code Exa 2.3 Find the ammount and compounded interest

```
//Exa2
clc;
clear;
close;
//given data is :
P=5000;//in rupees
n=3/2;//in years
r=10/2;//% per annum paid half yearly
m=2;//freq of compounding
A=P*(1+r/100)^(m*n);
CI=A-P;//in rupees
disp("Compound interest is : "+string(CI)+" Rupees."
```

```
)
```

Scilab code Exa 2.4 Find the time

```
//Exa4
clc;
clear;
close;
//given data is :
n=3;// in years
disp("Let P=x then A=2*x");
disp("Let r% be the rate of interest");
//formula : A=P(1+r/100)^n;
//putting values
disp("2*x=x(1+r/100)^3");
disp("or");
disp("2=(1+r/100)^3")
//on solving this eqn
r=((2^(1/3))-1)*100;//in %
disp(r,"rate is comtuted :")
disp("suppose in n years the amount x will become
   16*x, then by formula")
//16=(1+r/100)^n;
n=log(16)/log(1+r/100);
disp("Time is : "+string(n)+" years");
```

Scilab code Exa 2.5.a Find compound interest reckoned quarterly

```
//Exa5(a)
clc;
clear;
close;
//given data is :
```

```
6  P=4000;//in rupees
7  N=9;// months
8  R=6;// in % per annum
9  //if interest is reckoned quarterly
10 r=R/4;// in % per quarter,as there are 4 quarters in
       a year
11 n=(N/12)*4;//in quarters
12 Amount1=P*(1+r/100)^n;
13 CI1=Amount1-P;
14 disp(CI1,"Compound interest while reckoned quarterly
       :")
15 //Ans in the book is not correct
```

Scilab code Exa 2.5.b Find compound interest reckoned half yearly

```
1  //Exa5(b)
2  clc;
3  clear;
4  close;
5  //given data is :
6  P=4000;//in rupees
7  N=9;// months
8  R=6;// in % per annum
9  //if interest is reckoned half yearly
10 r=R/2;// in % per half yearly,as there are 2 half
       years in a year
11 n=(N/12)*2;//in half years
12 Amount2=P*(1+r/100)^n;
13 CI2=Amount2-P;
14 disp(CI2,"Compound interest while reckoned half
       yearly :")
15 //Ans in the book is not correct
```

Scilab code Exa 2.5.c Find compound interest reckoned yearly

```
1 //Exa5(c)
2 clc;
3 clear;
4 close;
5 //given data is :
6 P=4000;//in rupees
7 N=9;// months
8 R=6;// in % per annum
9 //if interest is reckoned yearly
10 r=R;// in % per annum
11 n=(N/12);//in years
12 Amount3=P*(1+r/100)^n;
13 CI3=Amount3-P;
14 disp(CI3,"Compound interest while reckoned yearly :"
   )
15 //Ans in the book is not correct
```

Scilab code Exa 2.6 Find compound interest

```
1 //Exa6
2 clc;
3 clear;
4 close;
5 //given data is :
6 P=10000;//in rupees
7 N=3;// years
8 r1=4;// in % per annum for 1st year
9 r2=5;// in % per annum for 2nd year
10 r3=10;// in % per annum for 3rd year
11 A=P*(1+r1/100)*(1+r2/100)*(1+r3/100);
12 CI=A-P;
13 disp("Compound interest is : "+string(CI)+" Rupees."
   )
```

Scilab code Exa 2.7 Find the amount

```
1 //Exa7
2 clc;
3 clear;
4 close;
5 //given data is :
6 CI=496.50;//compound interest in rupees
7 n=3;//in years
8 r=10;//rate in % per annum
9 disp("CI is given by : ");
10 disp("CI=P(1+r/100)^n-P");
11 //solving this eqn
12 P=CI/((1+r/100)^n-1);
13 disp("Principal amount is : "+string(P)+" Rupees.")
```

Scilab code Exa 2.8 Find the time

```
1 //Exa8
2 clc;
3 clear;
4 close;
5 //given data is :
6 P=2000;//in rupees
7 A=2662;//in rupees
8 r=10;//% per annum
9 //formula : A=P(1+r/100)^n;
10 //solving for n
11  n=log(A/P)/log(1+r/100);
12  disp("The time in which Rs.2000 will rise to Rs.
      2662 is  : "+string(n)+" years.")
```

Scilab code Exa 2.9 Find the principal amount

```
1  //Exa9
2  clc;
3  clear;
4  close;
5  //given data is :
6  r=5;//% per annum
7  n=2;//in years
8  //let amount=P
9  //CI=P(1+r/100)^n-P;
10 //SI=(P*r*n)/100;
11 //CI-SI=15 Rupees;given
12 disp("solving eqns for CI and SI, we get :")
13 disp("CI=0.1025*P");
14 disp("SI=0.10*P");
15 P=15/(0.1025-0.10);//using CI-SI
16 disp("Principal amount is : "+string(P)+" Rupees.")
```

Scilab code Exa 2.10 Calculate simple interest

```
1  //Exa9
2  clc;
3  clear;
4  close;
5  //given data is :
6  CI=102;//in rupees
7  r=4;//in % per annum
8  n=2;//in years
9  //Let principal amount is P
10 //Amount will be: A=P+102
11 //formula : A=P(1+r/100)^n=P+102;
```

```
12 P=102/((1+r/100)^n-1);
13 SI=(P*r*n)/100;
14 disp("Simple interest is : "+string(SI)+" Rupees.")
```

Chapter 4

Capital Budgeting

Scilab code Exa 4.1 Calculate payback period

```
1 //Exa 1
2 clc;
3 clear;
4 close;
5 //given data :
6 OrgInv=50000;//in Rs.
7 AnnualCashInflow=10000;//in Rs.
8 PaybackPeriod=OrgInv/AnnualCashInflow;
9 disp(PaybackPeriod,"Payback period of the project(in
    years) is : ");
```

Scilab code Exa 4.2 Calculate payback period

```
1 //Exa 2
2 clc;
3 clear;
4 close;
5 //given data :
```

```
6 //cash in flows of 1st,2nd,3rd and 4th years
7 CIF1=20000;//in Rs.
8 CIF2=30000;//in Rs.
9 CIF3=40000;//in Rs.
10 CIF4=50000;//in Rs.
11 //Cummulative cash in flows of 1st,2nd,3rd and 4th
     years
12 CumCIF1=20000;//in Rs.
13 CumCIF2=50000;//in Rs.
14 CumCIF3=90000;//in Rs.
15 CumCIF4=140000;//in Rs.
16 disp("In the table it can be seen that in 3 years
     90000 Rs has been recovered, Rs. 10000 is left
     out of initial investment.")
17 disp("Payback period is between 3 and 4 years.")
18 E=3;
19 B=100000-90000;//remaining balance to be recovered
20 C=50000;//cash flow of last year
21 PaybackPeriod=E+B/C;
22 disp(PaybackPeriod,"Payback period of the project(in
     years) is : ");
23 //Note : ans in the book is not accurate, given 3
     years and two month. but it is 3.2 years and can
     say 3 years 2 month plus 12 days.
```

Scilab code Exa 4.3 Calculate payback period

```
1 //Exa 1
2 clc;
3 clear;
4 close;
5 //given data for project A:
6 Investment=100000;//in Rs
7 AnnCIF=25000;//in Rs
8 PayBackPeriod=Investment/AnnCIF;//in years
```

```
disp(PayBackPeriod,"Payback period of the project A(
   in years) is : ")
//given data for project B:
Investment=70000;//in Rs
AnnCIF=15000;//in Rs
PayBackPeriod=Investment/AnnCIF;//in years
disp(PayBackPeriod,"Payback period of the project B(
   in years) is : ")
//given data for project C:
Investment=32500;//in Rs
AnnCIF=9000;//in Rs
PayBackPeriod=Investment/AnnCIF;//in years
disp(PayBackPeriod,"Payback period of the project C(
   in years) is : ")
//given data for project D:
Investment=97000;//in Rs
AnnCIF=18000;//in Rs
PayBackPeriod=Investment/AnnCIF;//in years
disp(PayBackPeriod,"Payback period of the project D(
   in years) is : ")

//given data for project E:
Investment=58500;//in Rs
AnnCIF=15500;//in Rs
PayBackPeriod=Investment/AnnCIF;//in years
disp(PayBackPeriod,"Payback period of the project E(
   in years) is : ")
```

Scilab code Exa 4.4 Calculate payback period

```
//Exa 4
clc;
clear;
close;
//given data :
```

```
6  inINV=100000;//initial investment in Rs. and equal
       for all projects
7  //Project A : cash in flows of 1st,2nd,3rd,4th and 5
       th years
8  CIF1=30000;//in Rs.
9  CIF2=30000;//in Rs.
10 CIF3=30000;//in Rs.
11 CIF4=30000;//in Rs.
12 CIF5=30000;//in Rs.
13 //Project A : Cummulative cash in flows of 1st,2nd,3
       rd,4th and 5th years
14 CumCIF1=30000;//in Rs.
15 CumCIF2=60000;//in Rs.
16 CumCIF3=90000;//in Rs.
17 CumCIF4=120000;//in Rs.
18 CumCIF5=150000;//in Rs.
19 disp("In the table it can be seen that in 3 years
       90000 Rs has been recovered, Rs. 10000 is left
       out of initial investment.")
20 disp("Payback period is between 3 and 4 years.")
21 E=3;
22 B=100000-90000;//remaining balance to be recovered
23 C=30000;//cash flow of last payback year
24 PaybackPeriod=E+B/C;
25 disp(PaybackPeriod,"Payback period of the project A(
       in years) is : ");
26
27
28 //Project B : cash in flows of 1st,2nd,3rd,4th and 5
       th years
29 CIF1=30000;//in Rs.
30 CIF2=40000;//in Rs.
31 CIF3=20000;//in Rs.
32 CIF4=10000;//in Rs.
33 CIF5=5000;//in Rs.
34 //Project B : Cummulative cash in flows of 1st,2nd,3
       rd,4th and 5th years
35 CumCIF1=30000;//in Rs.
```

```
36 CumCIF2=70000;//in Rs.
37 CumCIF3=90000;//in Rs.
38 CumCIF4=100000;//in Rs.
39 CumCIF5=105000;//in Rs.
40 disp("In the table it can be seen that in complete 4
       years 100000 Rs has been recovered.")
41 disp(4,"Payback period of the project B(in years) is
       : ");
42
43
44 //Project C : cash in flows of 1st,2nd,3rd,4th and 5
     th years
45 CIF1=40000;//in Rs.
46 CIF2=20000;//in Rs.
47 CIF3=30000;//in Rs.
48 CIF4=40000;//in Rs.
49 CIF5=10000;//in Rs.
50 //Project C : Cummulative cash in flows of 1st,2nd,3
     rd,4th and 5th years
51 CumCIF1=40000;//in Rs.
52 CumCIF2=60000;//in Rs.
53 CumCIF3=90000;//in Rs.
54 CumCIF4=130000;//in Rs.
55 CumCIF5=140000;//in Rs.
56 disp("In the table it can be seen that in 3 years
     90000 Rs has been recovered, Rs. 10000 is left
     out of initial investment.")
57 disp("Payback period is between 3 and 4 years.")
58 E=3;
59 B=100000-90000;//remaining balance to be recovered
60 C=40000;//cash flow of last payback year
61 PaybackPeriod=E+B/C;
62 disp(PaybackPeriod,"Payback period of the project C(
     in years) is : ");
63 //final conclusion
64 disp("As all the projects have payback period of
     less than 5 years and 5 years is the standard
     payback period, all the three projects are
```

```
acceptable.")
```

Scilab code Exa 4.5 Find average investment

```
1 //Exa 5
2 clc;
3 clear;
4 close;
5 //given data :
6 InInv=30000;//initial investment in Rs.
7 SalvageValue=3000;//in Rs.
8 WorkingCapital=6000;//in Rs.
9 Life=4;//expected life of the project
10 //Average Investment is given by : AvgInv=(InInv-
    SalvageValue)/2+SalvageValue+WorkingCapital
11 AvgInv=(InInv-SalvageValue)/2+SalvageValue+
    WorkingCapital
12 disp(AvgInv,"Average investment of the project is :
    ")
```

Scilab code Exa 4.6 Calculate accounting rate of return

```
1 //Exa 6
2 clc;
3 clear;
4 close;
5 //given data :
6 CostofMac=80000;//in Rs.
7 SalvageValue=10000//in Rs.
8 //Profits of 1st,2nd,3rd,4th and th years
9 P1=20000;//in Rs.
10 P2=40000;//in Rs.
11 P3=30000;//in Rs.
```

```
12 P4=15000;//in Rs.
13 P5=5000;//in Rs.
14 //Total profit before depreciation
15 Pbd=P1+P2+P3+P4+P5;//in Rs.
16 disp(Pbd,"Total profit before depreciation(in Rs) :
   ")
17 AvgP=Pbd/5;//Average profit per annum
18 disp(AvgP,"Average profit per annum(in Rs.) : ")
19 //Total Depreciation of the machine
20 TotDep=CostofMac-SalvageValue
21 disp(TotDep,"Total Depreciation of the machine(in Rs
   .) : ")
22 //Average Depreciation per annum
23 AvgD=TotDep/5;
24 disp(AvgD,"Average Depreciation per annum(in Rs.) :
   ")
25 //Average annual profit after Depreciation
26 AvgPafterDepreciation =AvgP-AvgD;
27 disp(AvgPafterDepreciation,"Average annual profit
   after Depreciation(in Rs.) : ")
28 //Return on original investment
29 ReturnOnOrg=(AvgPafterDepreciation/CostofMac)*100;//
   in %
30 disp(ReturnOnOrg,"Return on original investment(in %
   ) : ")
31 //Return on average investment
32 ReturnOnAvgInv=(AvgPafterDepreciation/((CostofMac+
   SalvageValue)/2))*100;//in %
33 disp(ReturnOnAvgInv,"Return on average investment(in
    %) : ")
```

Scilab code Exa 4.7 Calculate average rate of return

```
1 //Exa 7
2 clc;
```

```
clear;
close;
//given data :
//Initial Investment
InINv=25000;//in Rs.
//Scrap Value
ScrapValue=5000//in Rs.
//Profit before tax and Depreciation
P1=5000;//in Rs
P2=6000;//in Rs
P3=7000;//in Rs
P4=8000;//in Rs
P5=10000;//in Rs
//Total Profit
P=P1+P2+P3+P4+P5;//in Rs.
//Average Profit
AvgP=P/5;//in Rs.
//Total Depreciation by straight line method
D=4000*5;//in Rs.
//Average Depreciation
AvgD=D/5;//in Rs
//Net income before tax
NetIncomebefTax=AvgP-AvgD;
//Tax 50%
Tax=(NetIncomebefTax*50)/100;// in Rs
//Average annual income after tax and depreciation
NetInc=NetIncomebefTax-Tax;//in RS.
//Average Investment
AvgInv=(InINv+ScrapValue)/2;//in Rs.
disp(AvgInv,"Average Investment in Rs. : ")
//Average rate of return on average Investment
ARR=(NetInc/AvgInv)*100;//in %
disp(ARR,"Average rate of return on average
   Investment in % : ")
```

Scilab code Exa 4.8 Determine average rate of return

```
1 //Exa 8
2 clc;
3 clear;
4 close;
5 //given data for machine A :
6 OrgCost=56125;//in Rs.
7 //Additional Investment In working capital
8 AddInv=5000;//in Rs.
9 //Estimated Life
10 life=5;//inyears
11 //Estimated Salvage value
12 Salvage=3000;//in Rs.
13 //Average Income Tax Rate
14 Trate=60;//in %
15 //Average estimated income before tax and
     Depreciation
16 I1=13375;//in Rs.
17 I2=15375;//in Rs.
18 I3=17375;//in Rs.
19 I4=19375;//in Rs.
20 I5=21375;//in Rs.
21 //Total Income
22 I=I1+I2+I3+I4+I5;//in Rs.
23 //average income before tax and depreciation
24 AvgI=I/5;//in RS.
25 //Depreciation by straight line
26 D=(OrgCost-Salvage)/5;//in Rs
27 //Average Income after Depreciation
28 AvgID=AvgI-D;//in Rs.
29 //Tax by 60 %
30 Tax=(AvgID*60)/100;//in Rs
31 //Income after tax and depreciation
32 AvgITD=AvgID-Tax;//in Rs
33 //Average Rate of Return
34 ARR=(AvgITD/((OrgCost+Salvage)/2+AddInv))*100;//in
     Rs
```

```
35 disp(ARR,"Average Rate of Return of machine A in % :
       ")
36
37 //given data for machine B :
38 OrgCost=56125;//in Rs.
39 //Additional Investment In working capital
40 AddInv=6000;//in Rs.
41 //Estimated Life
42 life=5;//inyears
43 //Estimated Salvage value
44 Salvage=3000;//in Rs.
45 //Average Income Tax Rate
46 Trate=60;//in %
47 //Average estimated income before tax and
       Depreciation
48 I1=21375;//in Rs.
49 I2=19375;//in Rs.
50 I3=17375;//in Rs.
51 I4=15375;//in Rs.
52 I5=13375;//in Rs.
53 //Total Income
54 I=I1+I2+I3+I4+I5;//in Rs.
55 //average income before tax and depreciation
56 AvgI=I/5;//in RS.
57 //Depreciation by straight line
58 D=(OrgCost-Salvage)/5;//in Rs
59 //Average Income after Depreciation
60 AvgID=AvgI-D;//in Rs.
61 //Tax by 60 %
62 Tax=(AvgID*60)/100;//in Rs
63 //Income after tax and depreciation
64 AvgITD=AvgID-Tax;//in Rs
65 //Average Rate of Return
66 ARR=(AvgITD/((OrgCost+Salvage)/2+AddInv))*100;//in
       Rs
67 disp(ARR,"Average Rate of Return of machine B in % :
       ")
```

Scilab code Exa 4.9 Appraise profitability of proposed investment

```
1  //Exa 9
2  clc;
3  clear;
4  close;
5  //given data :
6  //initial cash outflows
7  ICO=50000;//in Rs.
8  //cash in flows of 1st,2nd,3rd and 4th years
9  CIF1=20000;//in Rs.
10 CIF2=15000;//in Rs.
11 CIF3=25000;//in Rs.
12 CIF4=10000;//in Rs.
13 //P.V factor at 10% rate of discount
14 PV1=0.909;
15 PV2=0.826;
16 PV3=0.751;
17 PV4=0.683;
18 //Present value for all cash in flows
19 P1=CIF1*PV1;// in Rs
20 P2=CIF2*PV2;// in Rs
21 P3=CIF3*PV3;// in Rs
22 P4=CIF4*PV4;// in Rs
23 //Total Present Value
24 P=P1+P2+P3+P4;// in Rs
25 //Net Present Value
26 NPV=P-ICO;// in Rs
27 disp(NPV,"Net Present Value is : ")
28 //profitabolity index
29 PVI=P/ICO;// unitless
30 disp(PVI,"Profitability Index of the project as
      calculated is : ")
31 disp("As Profitability Index of the project is
```

```
    greater than 1, the proposal can be accepted.")
32 //Net profitability
33 NPVI=NPV/ICO;
34 disp(NPVI,"Net profitability of the project is : ")
35 disp("As Net Profitability Index of the project is +
    ve, the proposal may be accepted.")
```

Scilab code Exa 4.10 Calculate internal rate of return

```
1  //Exa 10
2  clc;
3  clear;
4  close;
5  //given data :
6  //initial cash outflows
7  ICO=40000;//in Rs.
8  //cash in flows of 1st,2nd,3rd and 4th years is same
9  CIF=16000;//in Rs.
10 //PV Factor
11 PV=ICO/CIF;//unitless
12 disp(PV,"PV fator of the project is : ")
13 disp("This value is in between 2.4936 and 2.5887");
14 disp("Hence IRR of the project is expected to lie
    between 20% and 22%")
15 //PV of cash in flows at 20%
16 PV20=CIF*2.5887;//in Rs
17 PV22=CIF*2.4936;//in Rs
18 disp(PV20,"at 20% PV of cash in flows(in Rs) is : ")
19 disp(PV22,"at 22% PV of cash in flows(in Rs) is : ")
20 //By interpolation
21 LDR=20;//in % ;Lower discount rate
22 HDR=22;//in % ;Higher discount rate
23 P1=41419;//in Rs; Present value at lower rate of
    interest
24 P2=39898;//in Rs; Present value at higher rate of
```

```
    interest
25 IRR=LDR+((P1-ICO)/(P1-P2))*(HDR-LDR);//in % :
    Internal rate of return
26 disp(IRR,"Internal rate of return of the project(in
    %) : ")
```

Scilab code Exa 4.11 Calculate internal rate of return

```
1  //Exa 11
2  clc;
3  clear;
4  close;
5  //given data :
6  //initial cash outflows
7  ICO=10000;//in Rs.
8  //cash in flows of 1st,2nd and 3rd years
9  CIF1=5000;//in Rs.
10 CIF2=4000;//in Rs.
11 CIF3=3000;//in Rs.
12 //average annual CIF
13 CIF=(CIF1+CIF2+CIF3)/3;//in Rs
14 //step 1 : calculate first trial rate
15 PV=ICO/CIF;//unitless
16 disp(PV,"Trial PV factor is : ")
17 disp("The rate of return at this PV is approximately
    10%")
18 //P.V factor at 10% rate of discount
19 PV1=0.909;
20 PV2=0.826;
21 PV3=0.751;
22 //Present value for all cash in flows
23 P1=CIF1*PV1;// in Rs
24 P2=CIF2*PV2;// in Rs
25 P3=CIF3*PV3;// in Rs
26 //Total Present Value
```

```
27 P=P1+P2+P3;// in Rs
28 disp(P,"total present value of cash inflows at 10%
      rate is : ")
29 disp("As the total present value of cash inflows at
      10% rate is 10102 RS. is more than the cost of
      investment.")
30 disp("The next trial rate can be taken as 12%.")
31 //P.V factor at 12% rate of discount
32 PV1=0.893;
33 PV2=0.797;
34 PV3=0.712;
35 //Present value for all cash in flows
36 P1=CIF1*PV1;// in Rs
37 P2=CIF2*PV2;// in Rs
38 P3=CIF3*PV3;// in Rs
39 //Total Present Value
40 P=P1+P2+P3;// in Rs
41 disp(P,"total present value of cash inflows at 12%
      rate is : ")
42 disp("As the total present value of cash inflows at
      12% rate is 9789 RS. is less than the cost of
      investment.")
43 //IRR will be calculated by interpolation of these
      two rates
44 LDR=10;//in % ;Lower discount rate
45 HDR=12;//in % ;Higher discount rate
46 P1=10102;//in Rs; Present value at lower rate of
      interest
47 P2=9789;//in Rs; Present value at higher rate of
      interest
48 IRR=LDR+((P1-ICO)/(P1-P2))*(HDR-LDR);//in % :
      Internal rate of return
49 disp(IRR,"Internal rate of return of the project(in
      %) : ")
```

Scilab code Exa 4.12 Discuss according to internal rate of return

```
1  //Exa 12
2  clc;
3  clear;
4  close;
5  //given data :
6  //initial cash outflows
7  ICO=70000;//in Rs.
8  //cash in flows of 1st,2nd,3rd,4th and 5th years
9  CIF1=50000;//in Rs.
10 CIF2=40000;//in Rs.
11 CIF3=20000;//in Rs.
12 CIF4=10000;//in Rs.
13 CIF5=10000;//in Rs.
14 //P.V factor at 35% rate of discount
15 PV1=0.741;
16 PV2=0.549;
17 PV3=0.406;
18 PV4=0.301;
19 PV5=0.223;
20 //Present value for all cash in flows
21 P1=CIF1*PV1;// in Rs
22 P2=CIF2*PV2;// in Rs
23 P3=CIF3*PV3;// in Rs
24 P4=CIF4*PV4;// in Rs
25 P5=CIF5*PV5;// in Rs
26 //Total Present Value
27 P=P1+P2+P3+P4+P5;// in Rs
28 disp(P,"Total present value(in Rs) is : ")
29 disp("As the total present value of cash inflows at
     35% rate is 72370 RS. is more than the cost of
     investment.")
30 disp("The next trial rate can be taken as 40%.")
31 //P.V factor at 40% rate of discount
32 PV1=0.714;
33 PV2=0.510;
34 PV3=0.364;
```

```
35 PV4=0.260;
36 PV5=0.186;
37 //Present value for all cash in flows
38 P1=CIF1*PV1;// in Rs
39 P2=CIF2*PV2;// in Rs
40 P3=CIF3*PV3;// in Rs
41 P4=CIF4*PV4;// in Rs
42 P5=CIF5*PV5;// in Rs
43 //Total Present Value
44 P=P1+P2+P3+P4+P5;// in Rs
45 disp(P,"Total present value(in Rs) is : ")
46 disp("As the total present value of cash inflows at
     40% rate is 67840 RS. is less than the cost of
     investment.")
47 //IRR will be calculated by interpolation of these
     two rates
48 LDR=35;//in % ;Lower discount rate
49 HDR=40;//in % ;Higher discount rate
50 P1=72370;//in Rs; Present value at lower rate of
     interest
51 P2=67840;//in Rs; Present value at higher rate of
     interest
52 IRR=LDR+((P1-ICO)/(P1-P2))*(HDR-LDR);//in % :
     Internal rate of return
53 disp(IRR,"Internal rate of return of the project(in
     %) : ")
54 //Minimum desired rate of return fixed by management
     is 25%
55 disp("As the calculated IRR is greater than the
     minimum fixed rate. Project should be acepted.")
```

Scilab code Exa 4.13.1 Calculate payback period

```
1 //Exa 13.1
2 clc;
```

```
clear;
close;
//given data :
//initial cash outflows
ICO=80000;//in Rs.
//cash in flows of 10 years
CIF1=14000;//in Rs.
CIF2=14000;//in Rs.
CIF3=14000;//in Rs.
CIF4=14000;//in Rs.
CIF5=14000;//in Rs.
CIF6=16000;//in Rs.
CIF7=20000;//in Rs.
CIF8=30000;//in Rs.
CIF9=20000;//in Rs.
CIF10=8000;//in Rs.
//Cummulative cash in flows of 10 years
CumCIF1=14000;//in Rs.
CumCIF2=28000;//in Rs.
CumCIF3=42000;//in Rs.
CumCIF4=560000;//in Rs.
CumCIF5=70000;//in Rs.
CumCIF6=86000;//in Rs.
CumCIF7=106000;//in Rs.
CumCIF8=136000;//in Rs.
CumCIF9=156000;//in Rs.
CumCIF10=164000;//in Rs.
disp("In the table it can be seen that in 5 years
   70000 Rs has been recovered, Rs. 10000 is left
   out of initial investment.")
disp("Payback period is between 5 and 6 years.")
E=5;
B=80000-70000;//remaining balance to be recovered
C=16000;//cash flow of last payback year
PaybackPeriod=E+B/C;
disp(PaybackPeriod,"Payback period of the project(in
    years) is : ");
```

Scilab code Exa 4.13.2 Calculate average rate of return

```
1  //Exa 13.2
2  clc;
3  clear;
4  close;
5  //given data :
6  //initial cash outflows
7  ICO=80000;//in Rs.
8  //cash in flows of 10 years
9  CIF1=14000;//in Rs.
10 CIF2=14000;//in Rs.
11 CIF3=14000;//in Rs.
12 CIF4=14000;//in Rs.
13 CIF5=14000;//in Rs.
14 CIF6=16000;//in Rs.
15 CIF7=20000;//in Rs.
16 CIF8=30000;//in Rs.
17 CIF9=20000;//in Rs.
18 CIF10=8000;//in Rs.
19 //Cummulative cash in flows of 10 years
20 CumCIF1=14000;//in Rs.
21 CumCIF2=28000;//in Rs.
22 CumCIF3=42000;//in Rs.
23 CumCIF4=560000;//in Rs.
24 CumCIF5=70000;//in Rs.
25 CumCIF6=86000;//in Rs.
26 CumCIF7=106000;//in Rs.
27 CumCIF8=136000;//in Rs.
28 CumCIF9=156000;//in Rs.
29 CumCIF10=164000;//in Rs.
30 //average annual CIF
31 AvgCIF=CumCIF10/10;
32 //Average Depreciation per annum
```

```
33 AvgD=ICO/10;
34 //average investmet
35 AvgINV=40000;//in Rs
36 //Calculation of average rate of return
37 ARR=((AvgCIF-AvgD)/AvgINV)*100;//in %
38 disp(ARR,"Average rate of return of the project(in %
     ) is : ")
39 //Average annual cash in flow
40 AvgCIF=CIF10/10;//in Rs
41 //Annual Depreciation
42 ScrapValue=0;
43 ADep=(ICO-ScrapValue)/10;//in Rs
44 //Average investment
45 AvgInv=(ICO+ScrapValue)/2;//in Rs
```

Scilab code Exa 4.13.3 Calculate Net present value

```
1  //Exa 13.3
2  clc;
3  clear;
4  close;
5  //given data :
6  //initial cash outflows
7  ICO=80000;//in Rs.
8  //cash in flows of 10 years
9  CIF1=14000;//in Rs.
10 CIF2=14000;//in Rs.
11 CIF3=14000;//in Rs.
12 CIF4=14000;//in Rs.
13 CIF5=14000;//in Rs.
14 CIF6=16000;//in Rs.
15 CIF7=20000;//in Rs.
16 CIF8=30000;//in Rs.
17 CIF9=20000;//in Rs.
18 CIF10=8000;//in Rs.
```

```
19 //P.V factor at 10% rate of discount
20 PV1=0.909;
21 PV2=0.826;
22 PV3=0.751;
23 PV4=0.683;
24 PV5=0.621;
25 PV6=0.564;
26 PV7=0.513;
27 PV8=0.467;
28 PV9=0.424;
29 PV10=0.386;
30 //Present value for all cash in flows
31 P1=CIF1*PV1;// in Rs
32 P2=CIF2*PV2;// in Rs
33 P3=CIF3*PV3;// in Rs
34 P4=CIF4*PV4;// in Rs
35 P5=CIF5*PV5;// in Rs
36 P6=CIF6*PV6;// in Rs
37 P7=CIF7*PV7;// in Rs
38 P8=CIF8*PV8;// in Rs
39 P9=CIF9*PV9;// in Rs
40 P10=CIF10*PV10;// in Rs
41 //Total Present Value
42 P=P1+P2+P3+P4+P5+P6+P7+P8+P9+P10;// in Rs
43 disp(P,"Total present value(in Rs) is : ")
44 //Net Present Value at 10% discount rate
45 NPV=P-ICO;// in Rs
46 disp(NPV,"Net Present Value at 10% discount rate is
   : ")
```

Scilab code Exa 4.13.4 Calculate profitability index

```
1 //Exa 13.4
2 clc;
3 clear;
```

```
close;
//given data :
//initial cash outflows
ICO=80000;//in Rs.
//Total Present Value calculated in Exa13.3
P=97922;//in Rs
disp(P,"Total present value(in Rs) is : ")
//Profitability Index at 10% discount rate
PI=P/ICO;//unitless
disp(PI,"Profitability Index at 10% discount rate is
    : ")
```

Scilab code Exa 4.13.5 Calculate internal rate of return

```
//Exa 13.5
clc;
clear;
close;
//given data :
//initial cash outflows
ICO=80000;//in Rs.
//cash in flows of 10 years
CIF1=14000;//in Rs.
CIF2=14000;//in Rs.
CIF3=14000;//in Rs.
CIF4=14000;//in Rs.
CIF5=14000;//in Rs.
CIF6=16000;//in Rs.
CIF7=20000;//in Rs.
CIF8=30000;//in Rs.
CIF9=20000;//in Rs.
CIF10=8000;//in Rs.
//Cummulative cash in flows of 10 years
CumCIF1=14000;//in Rs.
CumCIF2=28000;//in Rs.
```

```
22 CumCIF3=42000;//in Rs.
23 CumCIF4=560000;//in Rs.
24 CumCIF5=70000;//in Rs.
25 CumCIF6=86000;//in Rs.
26 CumCIF7=106000;//in Rs.
27 CumCIF8=136000;//in Rs.
28 CumCIF9=156000;//in Rs.
29 CumCIF10=164000;//in Rs.
30 //P.V factor at 15% rate of discount
31 PV1=0.870;
32 PV2=0.756;
33 PV3=0.658;
34 PV4=0.572;
35 PV5=0.497;
36 PV6=0.432;
37 PV7=0.376;
38 PV8=0.327;
39 PV9=0.284;
40 PV10=0.247;
41 //Present value for all cash in flows
42 P1=CIF1*PV1;// in Rs
43 P2=CIF2*PV2;// in Rs
44 P3=CIF3*PV3;// in Rs
45 P4=CIF4*PV4;// in Rs
46 P5=CIF5*PV5;// in Rs
47 P6=CIF6*PV6;// in Rs
48 P7=CIF7*PV7;// in Rs
49 P8=CIF8*PV8;// in Rs
50 P9=CIF9*PV9;// in Rs
51 P10=CIF10*PV10;// in Rs
52 //Total Present Value
53 P=P1+P2+P3+P4+P5+P6+P7+P8+P9+P10;// in Rs
54 disp(P,"Total present value(in Rs) is : ")
55 //IRR By interpolation
56 LDR=10;//in % ;Lower discount rate
57 HDR=15;//in % ;Higher discount rate
58 P1=97922;//in Rs; Present value at lower rate of
     interest
```

```
59 P2=78840;//in Rs; Present value at higher rate of
      interest
60 IRR=LDR+((P1-ICO)/(P1-P2))*(HDR-LDR);//in % :
      Internal rate of return
61 disp(IRR,"Internal rate of return of the project(in
      %) : ")
```

Scilab code Exa 4.14.1 Compute payback period

```
1  //Exa 14(i)
2  clc;
3  clear;
4  close;
5  //given data :
6  inINV=50000;//initial investment in Rs. and equal
      for all projects
7  life=5;//in years
8  salvage=0;//in Rs.
9  TaxRate=55;//in %
10 //depreciation type :Straight line
11 D=inINV/life;//in Rs
12 //cash flows before tax of 1st,2nd,3rd,4th and 5th
      years
13 CBFT1=10000;//in Rs.
14 CBFT2=11000;//in Rs.
15 CBFT3=14000;//in Rs.
16 CBFT4=15000;//in Rs.
17 CBFT5=25000;//in Rs.
18 //Income before tax after depreciation
19 IBT1=CBFT1-D;//in Rs.
20 IBT2=CBFT2-D;//in Rs.
21 IBT3=CBFT3-D;//in Rs.
22 IBT4=CBFT4-D;//in Rs.
23 IBT5=CBFT5-D;//in Rs.
24 //Net income after Tax (55%) and depreciation
```

```
25 IATD1=IBT1-(IBT1*55)/100;//in Rs
26 IATD2=IBT2-(IBT2*55)/100;//in Rs
27 IATD3=IBT3-(IBT3*55)/100;//in Rs
28 IATD4=IBT4-(IBT4*55)/100;//in Rs
29 IATD5=IBT5-(IBT5*55)/100;//in Rs
30 //Average annual income after tax and depreciation
31 IATD=(IATD1+IATD2+IATD3+IATD4+IATD5)/5;//in Rs.
32 //Average Investment
33 AvgInv=(inINV+salvage)/2;//in Rs
34 //Annual cash inflows
35 ACI1=IATD1+D;//in RS
36 ACI2=IATD2+D;//in RS
37 ACI3=IATD3+D;//in RS
38 ACI4=IATD4+D;//in RS
39 ACI5=IATD5+D;//in RS
40 //Project A : Cummulative cash in flows of 1st,2nd,3
     rd,4th and 5th years
41 CumCIF1=ACI1;//in Rs.
42 CumCIF2=ACI1+ACI2;//in Rs.
43 CumCIF3=ACI1+ACI2+ACI3;//in Rs.
44 CumCIF4=ACI1+ACI2+ACI3+ACI4;//in Rs.
45 CumCIF5=ACI1+ACI2+ACI3+ACI4+ACI5;//in Rs.
46 //part (i) calculation of payback period
47 disp("In the computation it can be seen that in 4
     years 44500 Rs has been recovered, Rs. 5500 is
     left out of initial investment.")
48 disp("Payback period is between 4 and 5 years.")
49 E=4;
50 B=50000-44500;//remaining balance to be recovered
51 C=16750;//cash flow of last payback year
52 PaybackPeriod=E+B/C;
53 disp(PaybackPeriod,"Part(i) Payback period of the
     project(in years) is : ");
```

Scilab code Exa 4.14.2 Compute average rate of return

```
1  //Exa 14(ii)
2  clc;
3  clear;
4  close;
5  //given data :
6  inINV=50000;//initial investment in Rs. and equal
       for all projects
7  life=5;//in years
8  salvage=0;//in Rs.
9  TaxRate=55;//in %
10 //depreciation type :Straight line
11 D=inINV/life;//in Rs
12 //cash flows before tax of 1st,2nd,3rd,4th and 5th
       years
13 CBFT1=10000;//in Rs.
14 CBFT2=11000;//in Rs.
15 CBFT3=14000;//in Rs.
16 CBFT4=15000;//in Rs.
17 CBFT5=25000;//in Rs.
18 //Income before tax after depreciation
19 IBT1=CBFT1-D;//in Rs.
20 IBT2=CBFT2-D;//in Rs.
21 IBT3=CBFT3-D;//in Rs.
22 IBT4=CBFT4-D;//in Rs.
23 IBT5=CBFT5-D;//in Rs.
24 //Net income after Tax (55%) and depreciation
25 IATD1=IBT1-(IBT1*55)/100;//in Rs
26 IATD2=IBT2-(IBT2*55)/100;//in Rs
27 IATD3=IBT3-(IBT3*55)/100;//in Rs
28 IATD4=IBT4-(IBT4*55)/100;//in Rs
29 IATD5=IBT5-(IBT5*55)/100;//in Rs
30 //Average annual income after tax and depreciation
31 IATD=(IATD1+IATD2+IATD3+IATD4+IATD5)/5;//in Rs.
32 //Average Investment
33 AvgInv=(inINV+salvage)/2;//in Rs
34 //Annual cash inflows
35 ACI1=IATD1+D;//in RS
36 ACI2=IATD2+D;//in RS
```

```
ACI3=IATD3+D;//in RS
ACI4=IATD4+D;//in RS
ACI5=IATD5+D;//in RS
//Project A : Cummulative cash in flows of 1st,2nd,3rd,4th and 5th years
CumCIF1=ACI1;//in Rs.
CumCIF2=ACI1+ACI2;//in Rs.
CumCIF3=ACI1+ACI2+ACI3;//in Rs.
CumCIF4=ACI1+ACI2+ACI3+ACI4;//in Rs.
CumCIF5=ACI1+ACI2+ACI3+ACI4+ACI5;//in Rs.
//part (ii) calculation of ARR
ARR=(IATD/AvgInv)*100;//in %
disp(ARR,"Part(ii) Average rate of return (in %) : ")
```

Scilab code Exa 4.14.3 Compute Net present value

```
//Exa 14(iii)
clc;
clear;
close;
//given data :
inINV=50000;//initial investment in Rs. and equal for all projects
life=5;//in years
salvage=0;//in Rs.
TaxRate=55;//in %
//depreciation type :Straight line
D=inINV/life;//in Rs
//cash flows before tax of 1st,2nd,3rd,4th and 5th years
CBFT1=10000;//in Rs.
CBFT2=11000;//in Rs.
CBFT3=14000;//in Rs.
CBFT4=15000;//in Rs.
```

```
17 CBFT5=25000;//in Rs.
18 //Income before tax after depreciation
19 IBT1=CBFT1-D;//in Rs.
20 IBT2=CBFT2-D;//in Rs.
21 IBT3=CBFT3-D;//in Rs.
22 IBT4=CBFT4-D;//in Rs.
23 IBT5=CBFT5-D;//in Rs.
24 //Net income after Tax (55%) and depreciation
25 IATD1=IBT1-(IBT1*55)/100;//in Rs
26 IATD2=IBT2-(IBT2*55)/100;//in Rs
27 IATD3=IBT3-(IBT3*55)/100;//in Rs
28 IATD4=IBT4-(IBT4*55)/100;//in Rs
29 IATD5=IBT5-(IBT5*55)/100;//in Rs
30 //Average annual income after tax and depreciation
31 IATD=(IATD1+IATD2+IATD3+IATD4+IATD5)/5;//in Rs.
32 //Average Investment
33 AvgInv=(inINV+salvage)/2;//in Rs
34 //Annual cash inflows
35 ACI1=IATD1+D;//in RS
36 ACI2=IATD2+D;//in RS
37 ACI3=IATD3+D;//in RS
38 ACI4=IATD4+D;//in RS
39 ACI5=IATD5+D;//in RS
40 //Project A : Cummulative cash in flows of 1st,2nd,3
     rd,4th and 5th years
41 CumCIF1=ACI1;//in Rs.
42 CumCIF2=ACI1+ACI2;//in Rs.
43 CumCIF3=ACI1+ACI2+ACI3;//in Rs.
44 CumCIF4=ACI1+ACI2+ACI3+ACI4;//in Rs.
45 CumCIF5=ACI1+ACI2+ACI3+ACI4+ACI5;//in Rs.
46
47 //part (iii) calculation of Net Present value
48 //PV at 10%
49 //P.V factor at 10% rate of discount
50 PV1=0.909;
51 PV2=0.826;
52 PV3=0.751;
53 PV4=0.683;
```

```
PV5=0.621;
//Present value for all cash in flows at 10%
   discount Rate
P1=ACI1*PV1;// in Rs
P2=ACI2*PV2;// in Rs
P3=ACI3*PV3;// in Rs
P4=ACI4*PV4;// in Rs
P5=ACI5*PV5;// in Rs
//Total Present Value
P=P1+P2+P3+P4+P5;// in Rs
//Net Present Value
NPV=P-inINV;// in Rs
disp(NPV,"Part(iii) Net Present Value is : ")
```

Scilab code Exa 4.14.4 Calculate profitability index

```
//Exa 14(iv)
clc;
clear;
close;
//given data :
inINV=50000;//initial investment in Rs. and equal
   for all projects
life=5;//in years
salvage=0;//in Rs.
TaxRate=55;//in %
//depreciation type :Straight line
D=inINV/life;//in Rs
//cash flows before tax of 1st,2nd,3rd,4th and 5th
   years
CBFT1=10000;//in Rs.
CBFT2=11000;//in Rs.
CBFT3=14000;//in Rs.
CBFT4=15000;//in Rs.
CBFT5=25000;//in Rs.
```

```
18 //Income before tax after depreciation
19 IBT1=CBFT1-D;//in Rs.
20 IBT2=CBFT2-D;//in Rs.
21 IBT3=CBFT3-D;//in Rs.
22 IBT4=CBFT4-D;//in Rs.
23 IBT5=CBFT5-D;//in Rs.
24 //Net income after Tax (55%) and depreciation
25 IATD1=IBT1-(IBT1*55)/100;//in Rs
26 IATD2=IBT2-(IBT2*55)/100;//in Rs
27 IATD3=IBT3-(IBT3*55)/100;//in Rs
28 IATD4=IBT4-(IBT4*55)/100;//in Rs
29 IATD5=IBT5-(IBT5*55)/100;//in Rs
30 //Average annual income after tax and depreciation
31 IATD=(IATD1+IATD2+IATD3+IATD4+IATD5)/5;//in Rs.
32 //Average Investment
33 AvgInv=(inINV+salvage)/2;//in Rs
34 //Annual cash inflows
35 ACI1=IATD1+D;//in RS
36 ACI2=IATD2+D;//in RS
37 ACI3=IATD3+D;//in RS
38 ACI4=IATD4+D;//in RS
39 ACI5=IATD5+D;//in RS
40 //Project A : Cummulative cash in flows of 1st,2nd,3
     rd,4th and 5th years
41 CumCIF1=ACI1;//in Rs.
42 CumCIF2=ACI1+ACI2;//in Rs.
43 CumCIF3=ACI1+ACI2+ACI3;//in Rs.
44 CumCIF4=ACI1+ACI2+ACI3+ACI4;//in Rs.
45 CumCIF5=ACI1+ACI2+ACI3+ACI4+ACI5;//in Rs.
46 //part (iv) Profitability index at 10% discount rate
47 PI=P/inINV;//unitless
48 disp(PI,"Part(iv) Profitability index at 10%
     discount rate : ");
```

Scilab code Exa 4.14.5 Calculate internal rate of return

```
//Exa 14(v)
clc;
clear;
close;
//given data :
inINV=50000;//initial investment in Rs. and equal
   for all projects
life=5;//in years
salvage=0;//in Rs.
TaxRate=55;//in %
//depreciation type :Straight line
D=inINV/life;//in Rs
//cash flows before tax of 1st,2nd,3rd,4th and 5th
   years
CBFT1=10000;//in Rs.
CBFT2=11000;//in Rs.
CBFT3=14000;//in Rs.
CBFT4=15000;//in Rs.
CBFT5=25000;//in Rs.
//Income before tax after depreciation
IBT1=CBFT1-D;//in Rs.
IBT2=CBFT2-D;//in Rs.
IBT3=CBFT3-D;//in Rs.
IBT4=CBFT4-D;//in Rs.
IBT5=CBFT5-D;//in Rs.
//Net income after Tax (55%) and depreciation
IATD1=IBT1-(IBT1*55)/100;//in Rs
IATD2=IBT2-(IBT2*55)/100;//in Rs
IATD3=IBT3-(IBT3*55)/100;//in Rs
IATD4=IBT4-(IBT4*55)/100;//in Rs
IATD5=IBT5-(IBT5*55)/100;//in Rs
//Average annual income after tax and depreciation
IATD=(IATD1+IATD2+IATD3+IATD4+IATD5)/5;//in Rs.
//Average Investment
AvgInv=(inINV+salvage)/2;//in Rs
//Annual cash inflows
ACI1=IATD1+D;//in RS
ACI2=IATD2+D;//in RS
```

```
37 ACI3=IATD3+D;//in RS
38 ACI4=IATD4+D;//in RS
39 ACI5=IATD5+D;//in RS
40 //Project A : Cummulative cash in flows of 1st,2nd,3
     rd,4th and 5th years
41 CumCIF1=ACI1;//in Rs.
42 CumCIF2=ACI1+ACI2;//in Rs.
43 CumCIF3=ACI1+ACI2+ACI3;//in Rs.
44 CumCIF4=ACI1+ACI2+ACI3+ACI4;//in Rs.
45 CumCIF5=ACI1+ACI2+ACI3+ACI4+ACI5;//in Rs.
46 //part (v) Internal Rate of return
47 disp("As the total present value of cash inflows at
     10% rate is 45352 RS. is less than the cost of
     investment.")
48 disp("The next trial rate can be taken as 8%.")
49 //PV at 8%
50 //P.V factor at 8% rate of discount
51 PV1=0.926;
52 PV2=0.857;
53 PV3=0.794;
54 PV4=0.735;
55 PV5=0.681;
56 //Present value for all cash in flows at 8% discount
     Rate
57 P1=ACI1*PV1;// in Rs
58 P2=ACI2*PV2;// in Rs
59 P3=ACI3*PV3;// in Rs
60 P4=ACI4*PV4;// in Rs
61 P5=ACI5*PV5;// in Rs
62 //Total Present Value
63 P=P1+P2+P3+P4+P5;// in Rs
64 disp(P,"Total Present Value at 8% discount rate.")
65 disp("As the total present value of cash inflows at
     8% rate is 47996 RS. is less than the cost of
     investment.")
66 disp("The next trial rate can be taken as 6%.")
67 //PV at 6%
68 //P.V factor at 6% rate of discount
```

```
PV1=0.943;
PV2=0.890;
PV3=0.840;
PV4=0.792;
PV5=0.747;
//Present value for all cash in flows at 6% discount
    Rate
P1=ACI1*PV1;// in Rs
P2=ACI2*PV2;// in Rs
P3=ACI3*PV3;// in Rs
P4=ACI4*PV4;// in Rs
P5=ACI5*PV5;// in Rs
//Total Present Value
P=P1+P2+P3+P4+P5;// in Rs
disp("As the total present value of cash inflows at
   6% rate is 50857 RS. is more than the cost of
   investment.")
//IRR will be calculated by interpolation of these
   two rates 6% and 8%
LDR=6;//in % ;Lower discount rate
HDR=8;//in % ;Higher discount rate
P1=50857;//in Rs; Present value at lower rate of
   interest
P2=47996;//in Rs; Present value at higher rate of
   interest
IRR=LDR+((P1-inINV)/(P1-P2))*(HDR-LDR);//in % :
   Internal rate of return
disp(IRR,"Part(v) Internal rate of return of the
   project(in %) : ")
```

Chapter 5

Analysis of public projects

Scilab code Exa 5.2 Demonstrate use of annual present and future worth operation

```
1 //Exa 2
2 clc;
3 clear;
4 close;
5 // given data :
6 IC=1500000;// in Rupees
7 OMC=65000;// in Rupees(annual cost for operating and
      maintenance)
8 B=225000;// in Rupees(annual saving and benefits
9 ScrapValue=300000;// in Rupees
10 life=30;//in years
11 Irate=8;//in %
12 // // using present worth // //
13 //calculating present worth of savings
14 PWbenefits1=0;
15 for i=1:30
16     PWbenefits1=PWbenefits1+B/(1+Irate/100)^i;
17 end
18 //calculating present worth of scrap value
19
```

```
20 PWbenefits2=B/(1+Irate/100)^life;
21 PWbenefits=PWbenefits1+PWbenefits2;// total present
      worth of benefits
22 disp(PWbenefits,"Presnt worth of the benefits");
23 //calculating present worth of cost
24 PWcost1=IC;//same the initial cost
25 //calculating present worth of operating and
      maintenance cost
26 PWcost2=0;
27 for i=1:30
28     PWcost2=PWcost2+OMC/(1+Irate/100)^i;
29 end
30 PWcost=PWcost1+PWcost2;// total present worth of
      cost
31 disp(PWcost,"Presnt worth of the cost");
32 BCratio=PWbenefits/PWcost;// formula
33 disp(BCratio,"BCratio using present worth is : ")
34
35
36 // // using future worth // //
37 //calculating future worth of savings
38 FWbenefits1=0;
39 for i=1:30
40     FWbenefits1=FWbenefits1+B*(1+Irate/100)^(life-i)
         ;
41 end
42 //calculating future worth of scrap value
43
44 FWbenefits2=ScrapValue;
45 FWbenefits=FWbenefits1+FWbenefits2;// total future
      worth of benefits
46 disp(FWbenefits,"Future worth of the benefits");
47 //calculating Future worth of cost
48 FWcost1=IC*(1+Irate/100)^life;// the initial cost
49 //calculating future worth of operating and
      maintenance cost
50 FWcost2=0;
51 for i=1:30
```

```
52      FWcost2=FWcost2+OMC*(1+Irate/100)^(life-i);
53  end
54  FWcost=FWcost1+FWcost2;// total future worth of cost
55  disp(FWcost,"Future worth of the cost");
56  BCratio=FWbenefits/FWcost;// formula
57  disp(BCratio,"BCratio using future worth is : ")
58
59
60  // // using annual worth // //
61  //calculating annual worth of savings
62  AWbenefits1=0;
63  for i=1:30
64      AWbenefits1=AWbenefits1+B*(1+Irate/100)^(life-i)
        ;
65  end
66  //calculating annual worth of scrap value
67
68  AWbenefits2=ScrapValue;
69  AWbenefits=AWbenefits1+AWbenefits2;// total Annual
    worth of benefits
70  disp(AWbenefits,"Annual worth of the benefits");
71  //calculating Annual worth of cost
72  AWcost1=IC*(1+Irate/100)^life;// the initial cost
73  //calculating annual worth of operating and
    maintenance cost
74  AWcost2=0;
75  for i=1:30
76      AWcost2=AWcost2+OMC*(1+Irate/100)^(life-i);
77  end
78  AWcost=AWcost1+AWcost2;// total annual worth of cost
79  disp(AWcost,"Annual worth of the cost");
80  BCratio=AWbenefits/AWcost;// formula
81  disp(BCratio,"BCratio using Annual worth is : ")
82  disp("It can be seen that B/C ratio is same.")
83  // Note : answer given in the book is not as much
    accurate as calculated by scilab
```

Scilab code Exa 5.3 Calculate the BC ratio

```
1 //Exa 3
2 clc;
3 clear;
4 close;
5 //given data :
6 IC=1500000;// in Rupees
7 OMC=65000;// in Rupees(annual cost for operating and
      maintenance)
8 B=225000;// in Rupees(annual saving and benefits
9 ScrapValue=300000;// in Rupees
10 life=30;//in years
11 Irate=8;//in %
12 //calculating present worth of savings
13 PWbenefits1=0;
14 for i=1:30
15     PWbenefits1=PWbenefits1+B/(1+Irate/100)^i;
16 end
17 //calculating present worth of scrap value
18
19 PWbenefits2=B/(1+Irate/100)^life;
20 PWbenefits=PWbenefits1+PWbenefits2;// total present
     worth of benefits
21 disp(PWbenefits,"Presnt worth of the benefits");
22 //calculating present worth of cost
23 PWcost1=IC;//same the initial cost
24 //calculating present worth of operating and
     maintenance cost
25 PWcost2=0;
26 for i=1:30
27     PWcost2=PWcost2+OMC/(1+Irate/100)^i;
28 end
29 PWcost=PWcost1+PWcost2;// total present worth of
```

```
    cost
disp(PWcost,"Presnt worth of the cost");
// // using conventional B/C ratio // //
BCratio=PWbenefits/PWcost;// formula
disp(BCratio,"BCratio using conventional method is :
    ")

// // using modified B/C ratio // //
BCratio=(PWbenefits-PWcost2)/IC;// formula
disp(BCratio,"BCratio using conventional method is :
    ")
```

Chapter 8

Product Process and Operation Costing

Scilab code Exa 8.1 Process account and Abnormal Loss Acount

```
1  //Exa1
2  clc;
3  clear;
4  close;
5  //given data :
6  Production=1000//units
7  CostOfProduction=1850;//in Rs.
8  NormalLoss=10//in %
9  ActualLoss=150;//in Units
10 ScrapValue=50;//in Paise/unit
11 NLoss=Production*NormalLoss/100;//in Units
12 UnitsProduced=Production-NLoss;//in Units
13 CostPerUnit=(CostOfProduction-50*10^-2*NLoss)/
     UnitsProduced;//in Rs.
14 AbnormalLoss=ActualLoss-NLoss;//in Units
15 CostOfAbnormalLoss=AbnormalLoss*CostPerUnit;//in Rs.
16 disp("Process account : ");
17 disp("Production in Units = "+string(Production)+"
       Amount in Rs. "+string(CostOfProduction));
```

```
18 disp("By Normal Loss = "+string(NLoss)+"
     Amount in Rs. "+string(NLoss*ScrapValue*10^-2));
19 disp("By Finished Goods = "+string(Production-
     ActualLoss)+"      Amount in Rs. "+string(
     CostPerUnit*(Production-ActualLoss)));
20 disp("");
21 disp("Abnormal Loss Account : ");
22 disp("To Process Account in Units = "+string(
     AbnormalLoss)+"   Amount in Rs. "+string(
     CostPerUnit*AbnormalLoss));
23 disp("By Scrap Value = "+string(AbnormalLoss)+"
                    Amount in Rs. "+string(
     AbnormalLoss*ScrapValue*10^-2));
24 disp("By Costing Profit and Loss A/c "+"    Amount
     in Rs. "+string(AbnormalLoss*ScrapValue*10^-2+
     NLoss*ScrapValue*10^-2));
25 disp("Total Amount in Rs."+string(25+75));
```

Scilab code Exa 8.2 Equivalent Production

```
1 //Exa2
2 clc;
3 clear;
4 close;
5 //given data :
6 //Work-in-process on Jan 1, 40% complete
7 WorkComplete=1800//units
8 ProcessDuringMonth=20000;//in Units
9 TransferedNextProcess=18000//in Units
10 //Work-in-process on Jan 31, 50% complete
11 WorkComplete31jan=1000//units
12
13 disp("Opening Inventory of work-in-process
     Equivalent Units : "+string(WorkComplete*60/100))
     ;
```

```
14 disp("No. of units completed during the month :");
15 disp("Units Put into process "+string(
      ProcessDuringMonth));
16 disp("LESS: Units not completed "+string(
      WorkComplete31jan));
17 disp("Closing stock of work-in-process "+string(
      ProcessDuringMonth-WorkComplete31jan));
18 disp("50% completed during the month  = 500");
19 disp("Equivalent Production = 1080+19000+500 = 20580
      ");
```

Scilab code Exa 8.3 Calculation of effective production and process cost sheet

```
1  //Exa3
2  clc;
3  clear;
4  close;
5  //given data :
6  MaterialsCost=1800;//in Rs.
7  LabourCost=1700;//in Rs.
8  Overhead=500;//in Rs.
9  TotalCost=MaterialsCost+LabourCost+Overhead;//in Rs.
10 MaterialsPurchaseCost=37500;//in Rs.
11 WagesAmounted=39900;//in Rs.
12 OverheadAmounted=10640;//in Rs.
13 ActualMaterialCost=34250;//in Rs.
14 FinishedProduction=1250;//in Units
15 work_in_processInventory=250;//in Units
16
17 disp("Statement of Production : ");
18 disp("(Given in form of table below)");
19 disp("
      Units      Incomplete      Material      Labour
      Overhead      Total");
```

```
20 disp("Opening Inventory(to be completed 60%)
      200           60%           120          120
              120");
21 disp("Input
      1300          100%          1300         1300
             1300");
22 disp("

      1420         1420         1420");
23 disp("LESS : Closing Stock
      250           20%           50");
24 disp("

      40%                        100          100");
25 disp("

      1370         1320         1320");
26 disp("Current Cost

      34250        39900        10640");
27 disp("Current Cost per unit

      25           30.23        8.06         63.29");
28
29 disp("");
30 disp("Cost of opening work-in-process for completion
      (200 units)");
31 MaterialsToComplete=120*25;//in Rs.
32 LabourToComplete=120*30.23;//in Rs.
33 OverheadsToComplete=120*25;//in Rs.
34 Total=MaterialsToComplete+floor(LabourToComplete)+
      floor(OverheadsToComplete);//in Rs.
35 //Work-in-process as on 1st Jun
36 WorkInJun=4000;//in Rs.
37 CurrentProduction=(1250-200)*63.29;//in Rs.
38 //Cost of Work-in-process 30th Jun(250 Units)
39 MaterialC=200*25;//in Rs.
40 LabourC=150*30.23;//in Rs.
```

```
41 OverheadC=150*8.06;//in Rs.
42 disp("Cost of Work-in-process 30th Jun(250 Units) :
     ");
43 disp("Costs for:");
44 disp("Material : "+string(MaterialC));
45 disp("Labour : "+string(LabourC));
46 disp("Overhead : "+string(OverheadC));
47 disp("");
48 disp("Process Cost Sheet(Given in Tabularr form
     below) : ");
49 disp("Statement of Production : ");
50 disp("(Given in form of table below)");
51 disp("Particulars
     Units     completion     Total Cost     Cost Per
     Unit");
52 disp("Opening Work-in-Process");
53 disp("Materials
     200          40%          1800");
54 disp("Labour

     1700");
55 disp("Overhead

     500             4000");
56 disp("Input added : ");
57 disp("Materials
     1300                      34250");
58 disp("Labour

     39900");
59 disp("Overhead

     10640          84790");
60 disp("

     88790")
61 disp("LESS : Closing work-in-process              250
     ");
```

```
62 disp("Materials

   80%             5000");
63 disp("Labour

   60%             4534");
64 disp("Overhead

   60%             1209            10743

   43.00");
65 disp("Cost of Production
   1250         100%                              78047
                  62.44")
```

Scilab code Exa 8.4 Calculation of effective production and process account

```
1  //Exa4
2  clc;
3  clear;
4  close;
5  //given data :
6  OpeningStock=10000;//in Units
7  MaterialsCost=2250;//in Rs.
8  Wages=650;//in Rs.
9  Overhead=400;//in Rs.
10 UnitsIntroduced=40000;//in Units
11 MaterialsCost1=9250;//in Rs.
12 Wages1=4600;//in Rs.
13 Overhead1=3100;//in Rs.
14 disp("Calculation of Equivalent Production")
15 disp("(Given in form of table below)");
16 disp("
   Units      Materials      Labour and Overhead");
17 disp("Opening Work-in-Process
```

```
    10000       10000                10000");
18 disp("Units started and finished
    20000       20000                20000");
19 disp("Closing work-in-process
    20000       20000                5000");
20 disp("Material 100% complete labour and overhead 25%
    ")
21 disp("Effective Units
    50000       50000                35000")
22 disp("");
23 disp("Cost of Equivalent Units under the average
    cost method : ");
24 disp("Element
    Opening Cost     Cost put in     Total Cost
    Equivalent Production     Cost Per Unit");
25 disp("Material
    2250              9250          11500
                  50000                  0.23 ");
26 disp("Wages                                        650
                  4600          5250
                   35000                  0.15   ");
27 disp("Overhead                                     400
                  3100          3500
                   35000                  0.10");
28 disp("Total");
29 disp("
    3300              16950         20250
                                          0.48")
30 //Valuation of work-in-process(20000 Units
31 //let material 100% complete = M1
32 M1=20000*0.3;//in Rs.
33 //let labour 25% complete = L1
34 L1=5000*0.15;//in Rs.
35 //let Overhead 25% complete = O1
36 O1=5000*0.10;//in Rs.
37 //Total T1
38 T1=M1+L1+O1;//in Rs
39 ////cost of finished goods
```

```
40 // let material M2, Labour L2 and Overgead O2
41 M2=30000*0.30;//in Rs.
42 L2=30000*0.15;//in Rs.
43 O2=30000*0.10;//in Rs.
44 //Total T2
45 T2=M2+L2+O2;//in Rs.
46 disp("");
47 disp("Process account : ");
48 disp("Particulars                                    amount
       Particulars                                   amount");
49 disp("Opening stock                                  3000
        completed and transfered                      14400 "
   );
50 disp("Material                                     9250
        closing stock(work-in-process)                5850");
51 disp("Wages                                        4600");
52 disp("Overhead                                     3100");
53 disp("                                             20250
                                                     20250");
```

Scilab code Exa 8.5 Process accounts

```
1 //Exa5
2 clc;
3 clear;
4 close;
5 disp("Process No.1");
6 disp("                                Cost per article
   Total Cost                                  Cost per
   article Total Cost");
7 disp("To materials                    62.50
   15000          By Process No.2 Account
                    27600");
8 disp("To Labour                       33.34
   8000           (Output Transfered)          115.00")
```

```
    ;
9  disp("To Direct Expenses           10.83
    2600   ");
10 disp("To Indirect Expenses          8.33
    2000");
11 disp("                            115.00
    27600                                        115.00
           27860");
12 disp("");
13 disp("Process No.2");
14 disp("                             Cost per article
    Total Cost                              Cost per
    article Total Cost");
15 disp("To Process No.1 Account     115.00
    27600          By Process No.3 Account     270.00
           64800")
16 disp("To materials                 20.83
    5000");
17 disp("To Labour                    83.33
    2000");
18 disp("To Direct Expenses           30.00
    7200");
19 disp("To Indirect Expenses         20.84
    5000");
20 disp("                            270.00
    84800                                        270.00
           64800");
21 disp("");
22 disp("Process No.3");
23 disp("                             Cost per article
    Total Cost                              Cost per
    article Total Cost");
24 disp("To Process No.2 Account     270.00
    64800          By Finished Stock Account
    320.00         76800")
25 disp("To materials                  8.33
    2000");
26 disp("To Labour                    25.00
```

```
    6000");
27 disp("To Direct Expenses            10.42
    2500");
28 disp("To Indirect Expenses           6.25
    1500");
29 disp("                              320.00
    76800
    320.00         76800");
```

Scilab code Exa 8.6 Various process account and finished stock account

```
1  //Exa6
2  clc;
3  clear;
4  close;
5  disp("Copra Crushing Process Account");
6  disp("Particulars                Tons   Amount
    Particulars                Tons     Amount");
7  disp("To Copra Used               500    200000
    By sale of copra residue  175      11000");
8  disp("Labour                                2500
    By Loss                    25");
9  disp("Electric Power                         600
    Sale of copra sacks                    400");
10 disp("Sundry Mateials                        100
    Cost of crude oil");
11 disp("Repairs to Machinery                   280
    Rs. 646.67 per ton         300     194000");
12 disp("Steam                                  600");
13 disp("Factory Expenses                      1320");
14 disp("                                 500    205400
                                          500      205400");
15 disp("");
16 disp("Refining Process Account");
17 disp("Particulars               Tons   Amount
```

```
      Particulars                    Tons      Amount");
18 disp("To Copra oil                  300     194000
      By sale of by-products          45       6750");
19 disp("Labour                                 1000
      By Loss                          5");
20 disp("Electric Power                          360
      cost of refining oil");
21 disp("Sundry Mateials                        2000
      Rs. 768.2 per ton              250      192050");
22 disp("Repairs to Machinery                    330");
23 disp("Steam                                   450");
24 disp("Factory Expenses                        660");
25 disp("                              300     198800
                                       300      198800");
26 disp("");
27 disp("Finishing Process Account");
28 disp("Particulars                    Tons   Amount
      Particulars                    Tons      Amount");
29 disp("To Refining Process           250     192050
      By Loss                          2");
30 disp("Labour                                 1500
      cost of finished oil");
31 disp("Electric Power                          240
      Rs.784.68 per ton               248      194600");
32 disp("Repairs to Machinery                    140");
33 disp("Steam                                   450");
34 disp("Factory Expenses                        220");
35 disp("                              250     194600
                                       250      198800");
36 disp("");
37 disp("Finisheed stock account");
38 disp("                                  Tons      Amount
                              Tons      Amount");
39 disp("To finishing process              248      194600
      To balance at Rs. 914.2              202100");
40 disp("To cost of casks                             7500"
      );
41 disp("                                            202100
```

```
                                                    202100");
```

Scilab code Exa 8.7 Process account and Abnormal wastage and gain

```
1  //Exa7
2  clc;
3  clear;
4  close;
5  disp("Process A Account");
6  disp("Particulars                    Units    Rupees
         Particulars                         Units
     Rupees");
7  disp("To units issued at Rs. 1     10000    10000
          By normal wastage 3% of 10000      300
              75");
8  disp("per unit
                                                 units sold
     at 25 Paisa/unit");
9  disp("To sundry materials                       1000
          By Abnormal wastage                    200
             350");
10 disp("To labour                                 5000
          By process B output transfered    9500
     16625");
11 disp("To Direct Expenses                        1050");
12 disp("                                  10000    17050
                                                10000
     17050");
13 disp("");
14 disp("Process B Account");
15 disp("Particulars                     Units    Rupees
         Particulars                         Units
     Rupees");
16 disp("To Process A (output recd.)    9500    16625
          By normal wastage 5% of 9500");
```

```
17 disp("

      units sold at 50 Paisa/unit         475
      238");
18 disp("To sundry materials                    1500
          By process (output transf.)        9100
           27300");
19 disp("To wages                                8000");
20 disp("To Direct Expenses                      1188");
21 disp("To Abnormal Effective or ");
22 disp("Abnormal gains                    75      225")
23 disp("                                9575    27538
                                        9575
      27538");
24 disp("");
25 disp("Process C Account");
26 disp("Particulars                    Units   Rupees
         Particulars                        Units
      Rupees");
27 disp("To Process B (output recd.)   9100   27300
          By normal wastage 8% of 9100");
28 disp("

      units sold at Rs. 1/unit            728
      728");
29 disp("To sundry materials                     500");
30 disp("To wages                               6500
          By Abnormal Wastage                272
            1156");
31 disp("To Direct Expenses                     2009
          By finished stock (output)         8100
           34425");
32 disp("                                9100   36309
                                        9100
           36309");
33 //Calculation of Abnormal wastage and Abnormal Gain
34 //Process A :
35 CostOfAbnormalWastageA=16975*200/9700;//in Rupees
```

```
36 //Process B :
37 CostOfAbnormalWastageB=27075*75/9025;//in Rupees
38 //Process C :
39 CostOfAbnormalWastageC=35581*272/8372;//in Rupees
40 disp(CostOfAbnormalWastageA,"Process A: Cost Of
      Abnormal Wastage in Rs.");
41 disp(CostOfAbnormalWastageB,"Process B: Cost Of
      Abnormal Wastage in Rs.");
42 disp(CostOfAbnormalWastageC,"Process C: Cost Of
      Abnormal Wastage in Rs.");
43 disp("");
44 disp("Abnormal wastage account");
45 disp("Dr.

      Cr.");
46 disp("                              Units           Amount
                                                  Units
                Amount");
47 disp("To Process A                  200                350
          By sales of wasted units: 200");
48 disp("To Process C                  272               1156
          Units of A @ 25 paisa/unit                  50");
49 disp("

      272 units of Process C @ Rs. 1/unit    272
                  322");
50 disp("

      By Costing Profit & Loss Account
                              1184");
51 disp("                                                 1506

      1506");
52 disp("");
53 disp("Abnormal Gain Account");
54 disp("                                        Units
      Amount                          Units      Amount");
55 disp("To shortfall in normal wastage of 75
```

```
    38     By Process A              75          225");
56 disp("units @ 50 Paisa/each");
57 disp("To Costing Proit and Loss Account
    187");
58 disp("
    225                                          225");
```

Scilab code Exa 8.8 Computation of Equivalent and analysis of Cost sheet

```
1  //Exa7
2  clc;
3  clear;
4  close;
5  disp("1. Statement of production units for June
    2010:");
6  disp("                                    Units");
7  disp("Completed Units                     2500");
8  disp("(+)Closing work-in-process           500");
9  disp("                                    3000");
10 disp("(-)Opening work-in-process           400");
11 disp("New Units (Input)                   2600");
12 disp("");
13 disp("2. Computation of equivalent");
14 disp("
    Units    Incomplete %    Materials    Labour
    Overhead");
15 disp("(i)");
16 disp("W.I.P Inventory on 1st June(40% complete)");
17 disp("
    400        60%            240          240        240")
    ;
18 disp("Add:Input
    2600                      2600         2600       2600"
    );
19 disp("
```

```
      3000        20%           2840        2840      2840"
      );
20 disp("Less: W.I.P Inventory on 30th June
      500        40%           100         200       200")
      ;
21 disp("
      2500                     2740        2640      2640"
      );
22 disp("");
23 disp("Statement of cost per unit");
24 disp("                                Total Amoount
      Equivalents Cost per");
25 disp("                                     (Rs.)
      Units       Unit Rs.")
26 disp("Materials                            68500
      2740         25.00");
27 disp("Labour                               79800
      2640         30.23");
28 disp("Overhead                             21280
      2640          8.06");
29 disp("                                     169580
                        63.29")
30 disp("");
31 disp("3. Process cost for the month of June 2010");
32 disp("
      Amount       per unit");
33 disp("Materials(160 units i.e.,40% of 400 units)
          3600         22.50");
34 disp("Labour(160 units i.e.,40% of 400 units)
             3400         21.25");
35 disp("Overhead(160 units i.e.,40% of 400 units)
           1000          6.25")
36 disp("

      8000         50.00");
37 disp("");
38 disp("Put in process");
39 disp("Materials(2740 units)
```

```
    68500          25.00");
40 disp("Wages(2640 units)
    79800          30.23")
41 disp("Overheads(2640 units)
    21240           8.06");
42 disp("
    169580         63.29");
43 disp("                        Total
    177580");
44 disp("");
45 disp("Analysis of Cost sheet (FIFO)");
46 disp("Cost of Units Completed and transfered
    Units      Rate     Amount");
47 disp("
    Equivalent    Rs.       Rs.")
48 disp("Work-in-progress-1st June(400 units)
    160        50.00     8000");
49 disp("Materials for completing
    240        25.00     6000");
50 disp("Labour for completing
    240        30.23     7252");
51 disp("Overhead for completing
    240         8.06     1934");
52 disp("Cost of 400 units
                                                    23186"
    );
53 disp("Put in process and completed (2100 units)
                  6329    132909");
54 disp("Cost of 2500 units
                                                   156095"
    );
55 disp("Valuation of work in process- 30th june(500
    units)");
56 disp("Materials
    400        25.00     10000");
57 disp("Labour
    300        30.23      9068");
58 disp("Overhead
```

```
    300        8.06      2417 ")
59 disp("Cost of 500 units(W.I.P)
                                                21485");
60 disp("                                          Total
    Process cost Rs. 177580")
61 disp("");
62 disp("Process Cost Account");
63 disp("                        Units    Cost per    Amount
                              Units    Cost per    Amount")
    ;
64 disp("                                  unit
                                                    unit");
65 disp("                                   Rs.        Rs.
                                          Rs.        Rs.
    ");
66 disp("To W.I.P 1st June      400      50.00       8000
       By finished             2500     62.44      156095"
    );
67 disp("Materials              2600     25.00      68500
       By stock Account");
68 disp("Labour                          30.23      79800
       By W.I.P 30th June       500     42.97       21485"
    );
69 disp("Overheads                       8.06       21280")
    ;
70 disp("                       3000                177580
                               3000                 177580
    ");
```

Scilab code Exa 8.9 Output transfered and closing and opening work in progress

```
1 //Exa9
2 clc;
3 clear;
```

```
close;
disp("
   Amount                    Units");
disp("Production                    Units        %
         Equivalent      %      Equivalent");
disp("                                        Completion
        Units     Completion    Units");
disp("Finished & Transfered      8000        100%
            8000        100%       8000 ");
disp("Closing work-in-progress   2000        100%
            2000         50%       1000");
disp("Total Production          10000
                       10000                    9000");
disp("");
disp("Statement of cost");
disp("                                          Material
        Labour     Overhead   Total");
disp("                                            Rs.
            Rs.          Rs.      Rs.");
disp("Cost of opening work-in-progress       7500
           3000         1500      12000");
disp("Cost in and during the process       100000
          78000        39000     217000");
disp("              Total cost               107500
          81000        40500     229000");
disp("Eqivalent units                         10000
           9000         9000");
disp("Cost per unit                            10.75
           9.00         4.50      24.25");
disp("");
disp(8000*24.25,"(a) Value of output transfered :
   8000 units @ Rs. 24.25 is ");
disp("(b) Value of Closing work-in-progress");
disp(2000*10.75,"Material     2000 units @ 10.75 :")
   ;
disp(1000*9.00,"Labour        1000 units @ 9.00 :");
disp(1000*4.50,"Overhead      1000 units @ 4.50:");
disp(194000+35000,"Total Rs. = ");
```

Scilab code Exa 8.10 Closing Inventory and material transfered

```
1 //Exa10
2 clc;
3 clear;
4 close;
5 disp("As spoilage occurs during process, its cost
    will be charged both to the complete production
    and the closing inventory.");
6 disp("    Element Units                    Material
    Labour      Overhead");
7 disp("                                       Kgs.
            Kgs.         Kg.");
8 disp("                                       Rs.
             Rs.          Rs.");
9 disp("Current process accoount           27000
    50000        40000");
10 disp("Process cost per unit                2.5
              5            4");
11 disp("Closing Inventory                   125000
          5000         4000");
12 disp("Cost of material transfered to the second
    process :");
13 Opening_Inventory=10000;//in Rs
14 Process_Cost=117500;//in Rs
15 Closing_Inventory=21500;//in Rs
16 disp(Opening_Inventory + Process_Cost -
    Closing_Inventory,"Cost of material transfered to
     the second process= Rs.")
17 disp(5000*2.5,"Material                =Rs. ");
18 disp(5000*5*20/100,"Labour                  =Rs. ");
19 disp(5000*4*20/100,"Overhead                =Rs. ");
20 disp(5000*2.5+5000*5*20/100+5000*4*20/100,"Total= Rs
    . ")
```

```
21 disp("(b) It spoilage occurs at the end of the
     process, its cost will be charged only to the
     finished production and not to the closing
     inventory.");
22 disp("The calculation will be as follows : ");
23 disp("Effective Units
     Material      Labour      Overhead");
24 disp("From:      ")
25 disp("Opening inventory
                                    0          3000
          3000");
26 disp("Current input
     7000          7000          7000");
27 disp("Total complete units
     7000         10000         10000");
28 disp("Closing inventory
     5000          1000          1000");
29 disp("Effective units
     12000         11000         11000");
30 disp("Process cost                                  Rs.
     27500    Rs. 50000    Rs. 40000");
31 disp("Process cost per unit
     2.29          4.55          3.63");
32 disp("Closing inventory

     Rs.");
33 disp("Material     5000  x Rs.2.29          =11450");
34 disp("Labour       5000  x Rs.4.55 x 20%    =4550");
35 disp("Overhead     5000  x Rs.3.63 x 20%    =3630");
36 disp("                                      =Rs. 19630
     ");
37 disp(10000+117500-19630,"Cost of materials
     transfered to second process= Rs. ");
```

Scilab code Exa 8.11 Process account and Unrealised profit

```
1  //Exa11
2  clc;
3  clear;
4  close;
5  disp("Dr.                                                    Process
      A A/c                                          Cr.");
6  disp("                                                      Amount
                                                  Amount");
7  disp("                                                       Rs.
                                                     Rs.   ");
8  disp("To Material Consumed                                   2000
         By closing Stock                             1000");
9  disp("To Labour                                              3000
         By Process B(o/p Transfered)                 5000");
10 disp("To Profit(20% on transfer price)                      *1000")
11  disp("                                                     6000
                                                    6000");
12 disp("");
13 disp("Dr.                                                    Process
      B A/c                                          Cr.");
14 disp("                                                      Amount
                                                  Amount");
15 disp("                                                       Rs.
                                                     Rs.   ");
16 disp("To Process A(Transfer of o/p)                         5000
         By closing Stock                             2000
      ")
17 disp("To Material                                           3000
         By Process C(o/p Transfered)                10000");
18 disp("To Labour                                             2000");
19 disp("To Profit(20% on transfer price)                      *2000")
20 disp("                                                      12000
                                                  12000");
21 disp("");
22 disp("Dr.                                                    Process
      C A/c                                             Cr.");
23 disp("                                                       Amount
                                                    Amount");
```

```
24 disp("                                                    Rs.
                                                          Rs.   ");
25 disp("To Process B(Transfer of o/p)          10000
       By closing Stock                        3000
            ")
26 disp("To Material                                 1000
       By Finished stock(o/p Transfered)    15000");
27 disp("To Labour                                   4000");
28 disp("To Profit(20% on transfer price)           *3000")
29 disp("                                           18000
                                                   18000");
30 disp("") ;
31 disp("Finished Stock Accouont");
32 disp("                                             Amount
                                          Amount");
33 disp("                                               Rs.
                                             Rs.   ");
34 disp("To Process C(Output Recieved)              15000
       By Sales                          18000
   ")
35 disp("To Profit                                   5000
       By Closing Stock                   2000");
36 disp("                                           20000
                                          18000");
```

Scilab code Exa 8.12 Process account and statement of profit

```
1 //Exa12
2 clc;
3 clear;
4 close;
5 disp("Process (i) Account");
6 disp("                              Tons     Amount
                                       Tons       Amount");
7 disp("To Raw material               1000     200000
```

```
      By weight lost                50");
 8 disp("To Mfg. wages & expenses            87500
      By Scrap                      50        2500");
 9 disp("To profit                              9960
      By Sales                     300      105000");
10 disp("
      By transfer to process ii   600      189960");
11 disp("                                1000     297460
                                          1000      297460");
12 disp("");
13 disp("Process (ii) Account");
14 disp("                                   Tons     Amount
                                          Tons      Amount");
15 disp("To transfer from process i    6000     189960
         By weight lost                  60");
16 disp("To Mfg. wages & expenses                  39500
         By Scrap                       30        1500");
17 disp("To profit                                 13525
         By Sales                      255      127500");
18 disp("
                                                        By
       transfer to process ii   255      113985");
19 disp("                                  1000     297460
                                          600      242985");
20 disp("");
21 disp("Process (iiI) Account");
22 disp("                                   Tons     Amount
                                          Tons      Amount");
23 disp("To transfer from process ii    255     113895
         By weight lost                  51");
24 disp("To Mfg. wages & expenses                  10710
         By Scrap                       51        2550");
25 disp("To profit                                   255
         By Sales                      153      122400");
26 disp("                                  255     124950
                                          255      124950");
27 disp("");
28 disp("Statement of Profit : ");
```

```
29 disp("Profit as per process    i
                                  9960");
30 disp("Profit as per process   ii
                                 13525");
31 disp("Profit as per process  iii
                                  255");
32 disp("Total Profit
                                                23740");
33 disp("Less: Management Expenses              17500");
34 disp("Less: Selling Expenses                 10000
                27500");
35 disp("                                      Net Loss
               3760");
```

Scilab code Exa 8.13 Labour cost and value of work in progress

```
1  //Exa13
2  clc;
3  clear;
4  close;
5  disp("Unit Operation cost");
6  disp("                                    % of rejects
                                           labour cost per
       100");
7  disp("                                    to the o/p
          Ratio/100 for                    on o/p of
      each ");
8  disp("                                    of each
              cost of final    Labour cost    operation
      7/2    %    % ");
9  disp("Operation Input Rejects Output   operation %
         Output");
10 disp("    1        6000    1500   4500       33.33
               200                 10800            180
              240   360");
```

```
11 disp("     2        5625      375    5250        7.14
              150                  7875              140
             150   210");
12 disp("     3        5250      375    4875        7.69
              140                13650               260
             280   364 ");
13 disp("     4        6500      500    6000        8.33
              130                  7800              120
             130   156");
14 disp("     5        4800      800    4000        20
                  120                    4800              100
              120   120");
15 disp("

    100                44925              800         920
    1210");
16 disp("");
17 disp("On output of each operation=7/4");
18 disp("On final output of each operation=(8*6)/100");
19 disp("(a.) Column 6 indicates the numbers of units
    to be put in hand in each operation so that at
    the end of the final operation,100 good units are
     obtained. Thus in this case, 200 units would be
    the input to obtain 100 units of good output at
    the end of the 5th operation. ");
20 disp(round(100+100*20/100),"Output 5 = ");
21 disp(round(120+120*8.33/100),"Output 4 = ");
22 disp(round(130+130*7.69/100),"Output 3 = ");
23 disp(round(140+140*7.14/100),"Output 2 = ");
24 disp(round(150+150*33.33/100),"Output 1 = ");
25 disp(1210-800,"(b.) The labour cost of waste per 100
     units =");
26 disp("(c.) The work in progress can be computed as
    follows: work in progress at the end of ");
27 disp("Operation No. 1 = units in progress*(240)/100"
    );
28 disp("Operation No. 2 = units in progress
    *(240+150+240*7.14/100)/100");
```

```
29 disp("Operation No. 3 = units in progress
      *(407.14+280+407.14*7.69/100)/100");
30 disp("Operation No. 4 = units in progress
      *(718.46+130+718.46*8.33/100)/100");
31 disp("Operation No. 5 = units in progress
      *(908.34+60+908.34*20/100)/100");
32 disp("Valuation of work in progress");
33 disp("Stage(at the end of)    components    Value
      per 100 units    Total Value");
34 disp("OPeration
      Rs                    Rs");
35 disp("  1.                          1000
      240                 2400");
36 disp("  2.                           500
      407.14              2035.70");
37 disp("  3.                           750
      718.46              5388.45");
38 disp("  4.                          1000
      908.34              9083.40");
39 disp("  5.                           500
      1210                 6050");
```

Chapter 9

standard costing

Scilab code Exa 9.1 Calculate material variances

```
1 //Exa1
2 clc;
3 clear;
4 close;
5 //given data :
6 SQ=4000//in sq.ft.
7 AQ=4300//in sq.ft.
8 SP=5//in rupees per sq.ft.
9 AP=5.50//in rupees per sq.ft.
10 //(i) MCV
11 MCV=(SQ*SP)-(AQ*AP);//in rupees
12 //(ii) MPV
13 MPV=AQ*(SP-AP);//in rupees
14 //(iii) MUV
15 MUV=SP*(SQ-AQ);//in rupees
16 disp(MCV,"MCV=");
17 disp(MPV,"MPV=");
18 disp(MUV,"MUV=");
19 disp("Note :  ")
20 disp("Negative variances indicate adverse value  ")
   ;
```

```
21 disp("Positive variances indicate favourable value
       ")
```

Scilab code Exa 9.2 Calculate material variances

```
1  //Exa2
2  clc;
3  clear;
4  close;
5  //For first year
6  P1=500;//in rupees
7  n=3;//in years
8  r=10;//% per annum
9  T=1//in year
10 I1st=(P1*r*T)/100;
11 A1=P1+I1st;
12 //For second year
13 P2=A1;
14 I2nd=(P2*r*T)/100;
15 A2=P2+I2nd;
16 //For third year
17 P3=A2;
18 I3rd=(P3*r*T)/100;
19 A3=P3+I3rd;
20 //compound interest or 3 years
21 CI=A3-P1;
22 disp("Compound interest is : "+string(CI)+" Rupees."
     )
```

Scilab code Exa 9.3 Calculate material variances

```
1  //Exa3
2  clc;
```

```
3  clear;
4  close;
5  //given data :
6  SQ=100;//in Kgs
7  actualoutput=240000;//in Kgs
8  stdoutput=80;//in Kgs
9  costofmaterial=346500;//in Rupees
10 SQa=(SQ*actualoutput)/stdoutput;//SQa is SQ for
       actual output
11 SP=1.20;//in Rupees per Kg
12 AQ=315000;// in Kg
13 AP=costofmaterial/AQ;//in Rupees per Kg
14 //(i) MUV
15 MUV=SP*(SQa-AQ);//in rupees
16 //(ii) MPV
17 MPV=AQ*(SP-AP);//in rupees
18 //(iii)  MCV
19 MCV=(SQa*SP)-(AQ*AP);//in rupees
20 disp(MUV,"MUV=");
21 disp(MPV,"MPV=");
22 disp(MCV,"MCV=");
23 disp("Note :  ")
24 disp("Negative variances indicate adverse value   ")
       ;
25 disp("Positive variances indicate favourable value
       ")
```

Scilab code Exa 9.4 Calculate material variances

```
1  //Exa3
2  clc;
3  clear;
4  close;
5  //given data :
6  quantity=3000;//material purchased
```

```
value=9000;//rupees for material purchased
SQ=25;
stdoutput=1;//in tonnes
actualoutput=80;//in tonnes
//SQ for actual output
SQa=(SQ*actualoutput)/stdoutput;
//Material consumed or AQ
AQ=3000+100-600;//opening stock=100;Purchased=3000;
   closing stock=600;
SP=2;//rupees per unit
AP=value/quantity;//rupees per unit
//(i) MUV
MUV=SP*(SQa-AQ);//in rupees
//(ii) MPV
MPV=AQ*(SP-AP);//in rupees
//(iii)  MCV
MCV=(SQa*SP)-(AQ*AP);//in rupees
disp(MUV,"MUV=");
disp(MPV,"MPV=");
disp(MCV,"MCV=");
disp("Note :  ");
disp("Negative variances indicate adverse value   ")
   ;
disp("Positive variances indicate favourable value
    ");
```

Scilab code Exa 9.5 Calculate material variances

```
//Exa3
clc;
clear;
close;
//given data :
SQa=100//in Kgs
AQa=90//in Kgs
```

```
SPa=2//in rupees per Kgs
APa=2.20//in rupees per Kgs
SQb=50//in kg
AQb=60//in Kg
SPb=5//in rupees per Kg
APb=4.50//in rupees per Kg
//(i) MUVa
MUVa=SPa*(SQa-AQa);//in rupees
//(ii) MPVa
MPVa=AQa*(SPa-APa);//in rupees
//(iii)  MCVa
MCVa=(SQa*SPa)-(AQa*APa);//in rupees

//(i) MUVb
MUVb=SPb*(SQb-AQb);//in rupees
//(ii) MPVb
MPVb=AQb*(SPb-APb);//in rupees
//(iii)  MCVb
MCVb=(SQb*SPb)-(AQb*APb);//in rupees
RSQa=(SQa*150)/(SQa+SQb);
RSQb=(SQb*150)/(SQa+SQb);
//(iv) MMVa
MMVa=SPa*(RSQa-AQa);
//(iv) MMVb
MMVb=SPb*(RSQb-AQb);
//(v) MSUVa
MSUVa=SPa*(SQa-RSQa);
//(v) MSUVb
MSUVb=SPb*(SQb-RSQb);
//material A
disp("Variances for material A")
disp(MUVa,"MUV=");
disp(MPVa,"MPV=");
disp(MCVa,"MCV=");
disp(MMVa,"MMV=");
disp(MSUVa,"MSUV=")
//material B
disp("Variances for material B")
```

```
46 disp(MUVb,"MUV=");
47 disp(MPVb,"MPV=");
48 disp(MCVb,"MCV=");
49 disp(MMVb,"MMV=");
50 disp(MSUVb,"MSUV=")
51 disp("Note :  ")
52 disp("Negative variances indicate adverse value  ")
   ;
53 disp("Positive variances indicate favourable value
    ")
```

Scilab code Exa 9.6 Calculate material variances when mix ratio is same

```
1  //Exa 6
2  clc;
3  clear;
4  close;
5  // given data :
6  //mix ratio is the same
7  SQa=100//in Kgs
8  AQa=120//in Kgs
9  SPa=2//in rupees per Kgs
10 APa=2.20//in rupees per Kgs
11 SQb=50//in kg
12 AQb=60//in Kg
13 SPb=5//in rupees per Kg
14 APb=4.50//in rupees per Kg
15 //(1) Material cost variance
16 MCVa=(SQa*SPa)-(AQa*APa);//in rupees
17 MCVb=(SQb*SPb)-(AQb*APb);//in rupees
18 //(2) Material price variance
19 MPVb=AQb*(SPb-APb);//in rupees
20 MPVa=AQa*(SPa-APa);//in rupees
21 //(3) Material usage variance
22 MUVa=SPa*(SQa-AQa);//in rupees
```

```
MUVb=SPb*(SQb-AQb);//in rupees
//(4)  Material mix variance
RSQa=(SQa*180)/(150);
RSQb=(SQb*180)/(150);
MMVa=SPa*(RSQa-AQa);
MMVb=SPb*(RSQb-AQb);
//(4)  Material sub usage variance
MSUVa=SPa*(SQa-RSQa);
MSUVb=SPb*(SQb-RSQb);
//material A
disp("Variances for material A")
disp(MUVa,"MUV=");
disp(MPVa,"MPV=");
disp(MCVa,"MCV=");
disp(MMVa,"MMV=");
disp(MSUVa,"MSUV=")
//material B
disp("Variances for material B")
disp(MUVb,"MUV=");
disp(MPVb,"MPV=");
disp(MCVb,"MCV=");
disp(MMVb,"MMV=");
disp(MSUVb,"MSUV=")
disp("Note :  ")
disp("Negative variances indicate adverse value  ")
   ;
disp("Positive variances indicate favourable value
    ")
```

Scilab code Exa 9.7.a Calculate material cost variances

```
//Exa 7(i)
clc;
clear;
close;
```

```
// given data :
//mix ratio is not same
SQa=10//in Kgs
AQa=10//in Kgs
SPa=8//in rupees per Kgs
APa=7//in rupees per Kgs
SQb=8//in kg
AQb=9//in Kg
SPb=6//in rupees per Kg
APb=7//in rupees per Kg
SQc=4//in kg
AQc=5//in Kg
SPc=12//in rupees per Kg
APc=11//in rupees per Kg
//(1) Material cost variance
MCVa=(SQa*SPa)-(AQa*APa);//in rupees
MCVb=(SQb*SPb)-(AQb*APb);//in rupees
MCVc=(SQc*SPc)-(AQc*APc);//in rupees
disp(MCVa,"MCVa=");
disp(MCVb,"MCVb=");
disp(MCVc,"MCVc=");
disp("Note : ")
disp("Negative variances indicate adverse value ")
   ;
disp("Positive variances indicate favourable value
    ")
```

Scilab code Exa 9.7.b Calculate material usage variance

```
//Exa 7(ii)
clc;
clear;
close;
// given data :
//mix ratio is not same
```

```
SQa=10//in Kgs
AQa=10//in Kgs
SPa=8//in rupees per Kgs
APa=7//in rupees per Kgs
SQb=8//in kg
AQb=9//in Kg
SPb=6//in rupees per Kg
APb=7//in rupees per Kg
SQc=4//in kg
AQc=5//in Kg
SPc=12//in rupees per Kg
APc=11//in rupees per Kg
//(2) Material usage variance
MUVa=SPa*(SQa-AQa);//in rupees
MUVb=SPb*(SQb-AQb);//in rupees
MUVc=SPc*(SQc-AQc);//in rupees
disp(MUVa,"MUVa=");
disp(MUVb,"MUVb=");
disp(MUVc,"MUVc=");
disp("Note : ")
disp("Negative variances indicate adverse value ")
   ;
disp("Positive variances indicate favourable value
    ");
```

Scilab code Exa 9.7.c Calculate material price variance

```
//Exa 7(iii)
clc;
clear;
close;
// given data :
//mix ratio is not same
SQa=10//in Kgs
AQa=10//in Kgs
```

```
SPa=8//in rupees per Kgs
APa=7//in rupees per Kgs
SQb=8//in kg
AQb=9//in Kg
SPb=6//in rupees per Kg
APb=7//in rupees per Kg
SQc=4//in kg
AQc=5//in Kg
SPc=12//in rupees per Kg
APc=11//in rupees per Kg
//(2) Material price variance
MPVb=AQb*(SPb-APb);//in rupees
MPVa=AQa*(SPa-APa);//in rupees
MPVc=AQc*(SPc-APc);//in rupees
disp(MPVa,"MPVa=");
disp(MPVb,"MPVb=");
disp(MPVc,"MPVc=");
disp("Note : ")
disp("Negative variances indicate adverse value ")
   ;
disp("Positive variances indicate favourable value
    ")
```

Scilab code Exa 9.7.d Calculate material mix variance

```
//Exa 7(iv)
clc;
clear;
close;
// given data :
//mix ratio is not same
SQa=10//in Kgs
AQa=10//in Kgs
SPa=8//in rupees per Kgs
APa=7//in rupees per Kgs
```

```
SQb=8//in kg
AQb=9//in Kg
SPb=6//in rupees per Kg
APb=7//in rupees per Kg
SQc=4//in kg
AQc=5//in Kg
SPc=12//in rupees per Kg
APc=11//in rupees per Kg
//(4) Material mix variance
RSQa=(SQa*24)/(22);
RSQb=(SQb*24)/(22);
RSQc=(SQc*24)/(22)
MMVa=SPa*(RSQa-AQa);
MMVb=SPb*(RSQb-AQb);
MMVc=SPc*(RSQc-AQc);
disp(MMVa,"MMV=");
disp(MMVb,"MMV=");
disp(MMVc,"MMV=");
disp("Note : ")
disp("Negative variances indicate adverse value ")
   ;
disp("Positive variances indicate favourable value
    ");
```

Scilab code Exa 9.7.e Calculate material sub usage variances

```
//Exa 7(v)
clc;
clear;
close;
// given data :
//mix ratio is not same
SQa=10//in Kgs
AQa=10//in Kgs
SPa=8//in rupees per Kgs
```

```
APa=7//in rupees per Kgs
SQb=8//in kg
AQb=9//in Kg
SPb=6//in rupees per Kg
APb=7//in rupees per Kg
SQc=4//in kg
AQc=5//in Kg
SPc=12//in rupees per Kg
APc=11//in rupees per Kg
//(5) Material sub usage variance
MSUVa=SPa*(SQa-RSQa);
MSUVb=SPb*(SQb-RSQb);
MSUVc=SPc*(SQc-RSQc);
disp(MSUVa,"MSUV=");
disp(MSUVb,"MSUV=");
disp(MSUVc,"MSUV=");
disp("Note : ")
disp("Negative variances indicate adverse value ")
   ;
disp("Positive variances indicate favourable value
    ");
```

Scilab code Exa 9.8 Calculate material variances

```
//Exa 8
clc;
clear;
close;
// given data :
//mix ratio is not same
SQx=54//in Kgs
AQx=40//in Kgs
SPx=6//in rupees per Kgs
APx=6//in rupees per Kgs
SQy=44//in kg
```

```
AQy=50//in Kg
SPy=5//in rupees per Kg
APy=5//in rupees per Kg
SQz=20//in kg
AQz=24//in Kg
SPz=7//in rupees per Kg
APz=7//in rupees per Kg
//(1) Material cost variance
MCVx=(SQx*SPx)-(AQx*APx);//in rupees
MCVy=(SQy*SPy)-(AQy*APy);//in rupees
MCVz=(SQz*SPz)-(AQz*APz);//in rupees
//(2) Material price variance
MPVy=AQy*(SPy-APy);//in rupees
MPVx=AQx*(SPx-APx);//in rupees
MPVz=AQz*(SPz-APz);//in rupees
//(3) Material usage variance
MUVx=SPx*(SQx-AQx);//in rupees
MUVy=SPy*(SQy-AQy);//in rupees
MUVz=SPz*(SQz-AQz);//in rupees
//(4) Material mix variance
RSQx=(SQx*114)/(118);
RSQy=(SQy*114)/(118);
RSQz=(SQz*114)/(118)
MMVx=SPx*(RSQx-AQx);
MMVy=SPy*(RSQy-AQy);
MMVz=SPz*(RSQz-AQz);
//(5) Material sub usage variance
MSUVx=SPx*(SQx-RSQx);
MSUVy=SPy*(SQy-RSQy);
MSUVz=SPz*(SQz-RSQz);
//material Cost variance
disp("material Cost variances :")
disp(MCVx,"MCVx=");
disp(MCVy,"MCVy=");
disp(MCVz,"MCVz=");
//material Usage variance
disp("material Usage variances :")
disp(MUVx,"MUVx=");
```

```
disp(MUVy,"MUVy=");
disp(MUVz,"MUVz=");
//material Price variance
disp("material Price variances : ")
disp(MPVx,"MPVx=");
disp(MPVy,"MPVy=");
disp(MPVz,"MPVz=");
disp("As standard prices and atual prices are same,
   hence there is no material Price variance")
//material Mix variance
disp("material mix variances :")
disp(MMVx,"MMVx=");
disp(MMVy,"MMVy=");
disp(MMVz,"MMVz=");
//material Sub usage variance
disp("material sub Usage variances :")
disp(MSUVx,"MSUVx=")
disp(MSUVy,"MSUVy=")
disp(MSUVz,"MSUVz=")
disp("Note :  ")
disp("Negative variances indicate adverse value  ")
   ;
disp("Positive variances indicate favourable value
    ")
```

Scilab code Exa 9.9 Calculate material variances

```
//Exa 9
clc;
clear;
close;
// given data :
SQx1=120//in Kgs
AQx=112//in Kgs
SPx=5//in rupees per Kgs
```

```
APx=5//in rupees per Kgs
SQy1=80//in kg
AQy=88//in Kg
SPy=10//in rupees per Kg
APy=10//in rupees per Kg
Loss=30;//in %
//calculation of SQ for actual output
StandardYield=(SQx1+SQy1)-((SQx1+SQy1)*Loss)/100;//
   in kg
ActualYield=150;//in kg
SQx=(SQx1*ActualYield)/StandardYield;// in kg
SQy=(SQy1*ActualYield)/StandardYield;// in kg
//(1)  Material cost variance
MCVx=(SQx*SPx)-(AQx*APx);//in rupees
MCVy=(SQy*SPy)-(AQy*APy);//in rupees
//(2)  Material price variance
MPVy=AQy*(SPy-APy);//in rupees
MPVx=AQx*(SPx-APx);//in rupees
//(3)  Material usage variance
MUVx=SPx*(SQx-AQx);//in rupees
MUVy=SPy*(SQy-AQy);//in rupees
//(4)  Material mix variance
RSQx=(SQx*200)/(200);
RSQy=(SQy*200)/(200);
MMVx=SPx*(SQx1-AQx);
MMVy=SPy*(SQy1-AQy);
//(5)  Material Yield variance
TotalSC=SQx1*SPx+SQy1*SPy;// in Rs
TotalSQ=SQx1+SQy1-((SQx1+SQy1)*Loss)/100;//in Kg
SCperunit=TotalSC/TotalSQ;// in Rs
RSY=(StandardYield*(200))/(200);
MYV=SCperunit*(ActualYield-RSY);
//material Cost variance
disp("material Cost variances :")
disp(MCVx,"MCVx=");
disp(MCVy,"MCVy=");
disp(MCVx+MCVy,"Total MCV=");
//material Price variance
```

```
46 disp("material Price variances : ")
47 disp(MPVx,"MPVx=");
48 disp(MPVy,"MPVy=");
49 disp(MPVx+MPVy,"Total MPV=");
50 disp("As standard prices and atual prices are same,
     hence there is no material Price variance")
51 //material Usage variance
52 disp("material Usage variances :")
53 disp(MUVx,"MUVx=");
54 disp(MUVy,"MUVy=");
55 disp(MUVx+MUVy,"Total MUV=");
56 //material Mix variance
57 disp("material mix variances :")
58 disp(MMVx,"MMVx=");
59 disp(MMVy,"MMVy=");
60 disp(MMVx+MMVy,"Total MMV=");
61 //material Yield variance
62 disp("material Yield variances :")
63 disp(MYV,"MYV=");
64 disp("Note :  ")
65 disp("Negative variances indicate adverse value   ")
     ;
66 disp("Positive variances indicate favourable value
      ")
```

Scilab code Exa 9.10 Calculate material variances

```
1 //Exa 10
2 clc;
3 clear;
4 close;
5 // given data :
6 SQa1=200//in Kgs
7 AQa=250//in Kgs
8 SPa=3//in rupees per Kgs
```

```
APa=3.2//in rupees per Kgs
SQb1=250//in kg
AQb=300//in Kg
SPb=5//in rupees per Kg
APb=4.67//in rupees per Kg
SQc1=300//in kg
AQc=350//in Kg
SPc=6//in rupees per Kg
APc=6.43//in rupees per Kg

Loss=250;//in Kg
//calculation of SQ for actual output
StandardYield=(SQa1+SQb1+SQc1)-Loss;//in kg
ActualYield=500;//in kg
SQa=(SQa1*ActualYield)/StandardYield;// in kg
SQb=(SQb1*ActualYield)/StandardYield;// in kg
SQc=(SQc1*ActualYield)/StandardYield;// in kg
//(1) Material cost variance
MCVa=(SQa1*SPa)-(AQa*APa);//in rupees
MCVb=(SQb1*SPb)-(AQb*APb);//in rupees
MCVc=(SQc1*SPc)-(AQc*APc);//in rupees
//(2) Material price variance
MPVb=AQb*(SPb-APb);//in rupees
MPVa=AQa*(SPa-APa);//in rupees
MPVc=AQc*(SPc-APc);//in rupees
//(3) Material usage variance
MUVa=SPa*(SQa1-AQa);//in rupees
MUVb=SPb*(SQb1-AQb);//in rupees
MUVc=SPc*(SQc1-AQc);//in rupees
//(4) Material mix variance
RSQa=(SQa1*900)/(750);
RSQb=(SQb1*900)/(750);
RSQc=(SQc1*900)/(750);
MMVa=SPa*(RSQa-AQa);
MMVb=SPb*(RSQb-AQb);
MMVc=SPc*(RSQc-AQc);
//(5) Material Yield variance
TotalSC=SQa1*SPa+SQb1*SPb+SQc1*SPc;// in Rs
```

```
47 TotalSQ=SQa1+SQb1+SQc1-((SQa1+SQb1+SQc1)*Loss)/100;
     //in Kg
48 SCperunit=TotalSC/StandardYield;// in Rs
49 RSY=(StandardYield*(900))/(750);
50 MYV=SCperunit*(ActualYield-RSY);
51 //material Cost variance
52 disp("material Cost variances :")
53 disp(MCVa,"MCVa=");
54 disp(MCVb,"MCVb=");
55 disp(MCVc,"MCVc=");
56 disp(MCVa+MCVb+MCVc,"Total MCV=");
57 //material Price variance
58 disp("material Price variances : ")
59 disp(MPVa,"MPVa=");
60 disp(MPVb,"MPVb=");
61 disp(MPVc,"MPVc=");
62 disp(MPVa+MPVb+MPVc,"Total MPV=");
63 //material Usage variance
64 disp("material Usage variances :")
65 disp(MUVa,"MUVa=");
66 disp(MUVb,"MUVb=");
67 disp(MUVc,"MUVc=");
68 disp(MUVa+MUVb+MUVc,"Total MUV=");
69 //material Mix variance
70 disp("material mix variances :")
71 disp(MMVa,"MMVa=");
72 disp(MMVb,"MMVb=");
73 disp(MMVc,"MMVc=");
74 disp(MMVa+MMVb+MMVc,"Total MMV=");
75 //material Yield variance
76 disp("material Yield variances :")
77 disp(MYV,"MYV=");
78 disp("Note :  ")
79 disp("Negative variances indicate adverse value   ")
     ;
80 disp("Positive variances indicate favourable value
      ")
```

Scilab code Exa 9.11 Calculate material variances

```
1  //Exa 11
2  clc;
3  clear;
4  close;
5  // given data :
6  SQa1=240//in Kgs
7  AQa=280//in Kgs
8  SPa=4//in rupees per Kgs
9  APa=3.8//in rupees per Kgs
10 SQb1=160//in kg
11 AQb=120//in Kg
12 SPb=3//in rupees per Kg
13 APb=3.6//in rupees per Kg
14 Loss=10;//in %
15 //calculation of SQ for actual output
16 StandardYield=(SQa1+SQb1)-((SQa1+SQb1)*Loss)/100;//
      in kg
17 ActualYield=364;//in kg
18 SQa=(SQa1*ActualYield)/StandardYield;// in kg
19 SQb=(SQb1*ActualYield)/StandardYield;// in kg
20 //(1) Material cost variance
21 MCVa=(SQa*SPa)-(AQa*APa);//in rupees
22 MCVb=(SQb*SPb)-(AQb*APb);//in rupees
23 //(2) Material price variance
24 MPVb=AQb*(SPb-APb);//in rupees
25 MPVa=AQa*(SPa-APa);//in rupees
26 //(4) Material mix variance
27 RSQa=(SQa1*400)/(400);
28 RSQb=(SQb1*400)/(400);
29 MMVa=SPa*(RSQa-AQa);
30 MMVb=SPb*(RSQb-AQb);
31 //(5) Material Yield variance
```

```
32 TotalSC=SQa1*SPa+SQb1*SPb;// in Rs
33 TotalSQ=SQa1+SQb1-((SQa1+SQb1)*Loss)/100;//in Kg
34 SCperunit=TotalSC/StandardYield;// in Rs
35 RSY=(StandardYield*(400))/(400);
36 MYV=SCperunit*(ActualYield-RSY);
37 //material Price variance
38 disp("material Price variances : ")
39 disp(MPVa,"MPVa=");
40 disp(MPVb,"MPVb=");
41 disp(MPVa+MPVb,"Total MPV=");
42 //material Mix variance
43 disp("material mix variances :")
44 disp(MMVa,"MMVa=");
45 disp(MMVb,"MMVb=");
46 disp(MMVa+MMVb,"Total MMV=");
47 //material Yield variance
48 disp("material Yield variances :")
49 disp(MYV,"MYV=");
50 //material Cost variance
51 disp("material Cost variances :")
52 disp(MCVa,"MCVa=");
53 disp(MCVb,"MCVb=");
54 disp(MCVa+MCVb,"Total MCV=");
55 disp("Note :  ")
56 disp("Negative variances indicate adverse value   ")
   ;
57 disp("Positive variances indicate favourable value
    ")
```

Scilab code Exa 9.12 Calculate labour variances

```
1 //Exa 12
2 clc;
3 clear;
4 close;
```

```
// given data :
ST=10;//in hours
AT=8;//in hours
SR=9;//in Rs/Hour
AR=10;//in Rs/Hour
//Labour Cost variance
LCV=(ST*SR)-(AT*AR)
//Labour Efficiency variance
LEV=SR*(ST-AT);// in Rs
//Labour Rate variance
LRV=AT*(SR-AR);// in Rs
disp(LCV,"Labour Cost variance : ")
disp(LEV,"Labour Efficiency variance : ")
disp(LRV,"Labour Rate variance : ")
disp("Negative variances indicate adverse value   ")
   ;
disp("Positive variances indicate favourable value
    ");
```

Scilab code Exa 9.13 Calculate labour variances

```
//Exa 13
clc;
clear;
close;
// given data :
ST=4300;//in hours
AT=4000;//in hours
SR=3;//in Rs/Hour
GWP=16400;//in RS
AR=GWP/AT;//in Rs/Hour
//Labour Cost variance
LCV=(ST*SR)-(AT*AR)
//Labour Efficiency variance
LEV=SR*(ST-AT);// in Rs
```

```
15 //Labour Rate variance
16 LRV=AT*(SR-AR);// in Rs
17 disp(LCV,"Labour Cost variance : ")
18 disp(LRV,"Labour Rate variance : ")
19 disp(LEV,"Labour Efficiency variance : ")
20 disp("Negative variances indicate adverse value   ")
     ;
21 disp("Positive variances indicate favourable value
     ");
```

Scilab code Exa 9.14 Calculate idle time variances

```
1 //Exa 14
2 clc;
3 clear;
4 close;
5 // given data :
6 ST=3200;//in hours
7 AT=3000;//in hours
8 SR=1.5;//in Rs/Hour
9 IT=100;//in Rs/Hour
10 AWP=6000;//in RS
11 AR=AWP/AT;//in Rs/Hour
12 //Labour Cost variance
13 LCV=(ST*SR)-(AT*AR)
14 //Labour Efficiency variance
15 AT1=AT-IT;//idle time is deducted to calculate real
     efficiency
16 LEV=SR*(ST-AT1);// in Rs
17 //Labour Rate variance
18 LRV=AT*(SR-AR);// in Rs
19 //Labour Idle Time variance
20 ITV=IT*SR;// in Rs
21 disp(LCV,"Labour Cost variance : ")
22 disp(LEV,"Labour Efficiency variance : ")
```

```
23 disp(LRV,"Labour Rate variance : ")
24 disp(ITV,"Labour Idle Time variance : ")
25 disp("Negative variances indicate adverse value   ")
     ;
26 disp("Positive variances indicate favourable value
     ");
```

Scilab code Exa 9.15 Calculate idle time variances

```
1  //Exa 15
2  clc;
3  clear;
4  close;
5  // given data :
6  P=1000;//in units
7  T=10;//hours/unit
8  ST=P*T;//in hours
9  AT=10800;//in hours
10 SR=5;//in Rs/Hour
11 AR=5.20;//in Rs/Hour
12 IT=400;//in Rs/Hour
13 //Labour Cost variance
14 LCV=(ST*SR)-(AT*AR)
15 //Labour Efficiency variance
16 AT1=AT-IT;//idle time is deducted to calculate real
     efficiency
17 LEV=SR*(ST-AT1);// in Rs
18 //Labour Rate variance
19 LRV=AT*(SR-AR);// in Rs
20 //Labour Idle Time variance
21 ITV=IT*SR;// in Rs
22 disp(LCV,"Labour Cost variance : ")
23 disp(LEV,"Labour Efficiency variance : ")
24 disp(LRV,"Labour Rate variance : ")
25 disp(ITV,"Labour Idle Time variance : ")
```

```
26 disp("Negative variances indicate adverse value   ")
   ;
27 disp("Positive variances indicate favourable value
    ");
```

Scilab code Exa 9.16 Calculate labour variances

```
1  //Exa 16
2  clc;
3  clear;
4  close;
5  // given data :
6  STa=20;//in hours
7  STb=25;//in hours
8  ATa=30;//in hours
9  ATb=15;//in hours
10 SRa=3;//in Rs/Hour
11 SRb=4;//in Rs/Hour
12 ARa=3;//in Rs/Hour
13 ARb=4.5;//in Rs/Hour
14 //Labour Cost variance
15 LCVa=(STa*SRa)-(ATa*ARa)
16 LCVb=(STb*SRb)-(ATb*ARb)
17 //Labour Efficiency variance
18 LEVa=SRa*(STa-ATa);// in Rs
19 LEVb=SRb*(STb-ATb);// in Rs
20 //Labour Rate variance
21 LRVa=ATa*(SRa-ARa);// in Rs
22 LRVb=ATb*(SRb-ARb);// in Rs
23 //Labour Mix variance
24 TAMT=ATa+ATb;// total of actual mix time
25 TSMT=STa+STb;// total of standard mix time
26 RSTa=(STa*TAMT)/TSMT
27 RSTb=(STb*TAMT)/TSMT
28 LMVa=SRa*(RSTa-ATa);// in Rs
```

```
29 LMVb=SRb*(RSTb-ATb);// in Rs
30 disp("Labour Cost variance :")
31 disp(LCVa,"Labour Cost variance LCVa: ")
32 disp(LCVb,"Labour Cost variance LCVb: ")
33 disp(LCVa+LCVb,"Labour Cost variance :")
34 disp("Labour Efficiency variance :")
35 disp(LEVa,"Labour Efficiency variance LEVa: ")
36 disp(LEVb,"Labour Efficiency variance LEVb: ")
37 disp(LEVa+LEVb,"Labour Efficiency variance :")
38 disp("Labour Rate variance :")
39 disp(LRVa,"Labour Rate variance LRVa: ")
40 disp(LRVb,"Labour Rate variance LRVb: ")
41 disp(LRVa+LRVb,"Labour Rate variance :")
42 disp("Labour Mix variance :")
43 disp(LMVa,"Labour Mix variance LMVa: ")
44 disp(LMVb,"Labour Mix variance LMVb: ")
45 disp(LMVa+LMVb,"Labour Mix variance :")
46 disp("Negative variances indicate adverse value   ")
   ;
47 disp("Positive variances indicate favourable value
    ");
```

Scilab code Exa 9.17 Calculate labour variances

```
1 //Exa 17
2 clc;
3 clear;
4 close;
5 // given data :
6 STs=1600;//in hours
7 STu=2400;//in hours
8 ATs=2500;//in hours
9 ATu=2500;//in hours
10 SRs=0.50;//in Rs/Hour
11 SRu=0.60;//in Rs/Hour
```

```
ARs=0.40;//in Rs/Hour
ARu=0.50;//in Rs/Hour
//Labour Cost variance
LCVs=(STs*SRs)-(ATs*ARs)
LCVu=(STu*SRu)-(ATu*ARu)
//Labour Efficiency variance
LEVs=SRs*(STs-ATs);// in Rs
LEVu=SRu*(STu-ATu);// in Rs
//Labour Rate variance
LRVs=ATs*(SRs-ARs);// in Rs
LRVu=ATu*(SRu-ARu);// in Rs
//Labour Mix variance
TAMT=ATs+ATu;// total of actual mix time
TSMT=STs+STu;// total of standard mix time
RSTs=(STs*TAMT)/TSMT
RSTu=(STu*TAMT)/TSMT
LMVs=SRs*(RSTs-ATs);// in Rs
LMVu=SRu*(RSTu-ATu);// in Rs
//Labour Sub Efficiency variance
LSEVs=SRs*(STs-RSTs);// in Rs
LSEVu=SRu*(STu-RSTu);// in Rs
disp("Labour Cost variance :")
disp(LCVs,"Labour Cost variance LCVs: ")
disp(LCVu,"Labour Cost variance LCVu: ")
disp(LCVs+LCVu,"Labour Cost variance :")
disp("Labour Efficiency variance :")
disp(LEVs,"Labour Efficiency variance LEVs: ")
disp(LEVu,"Labour Efficiency variance LEVu: ")
disp(LEVs+LEVu,"Labour Efficiency variance :")
disp("Labour Rate variance :")
disp(LRVs,"Labour Rate variance LRVs: ")
disp(LRVu,"Labour Rate variance LRVu: ")
disp(LRVs+LRVu,"Labour Rate variance :")
disp("Labour Mix variance :")
disp(LMVs,"Labour Mix variance LMVs: ")
disp(LMVu,"Labour Mix variance LMVu: ")
disp(LMVs+LMVu,"Labour Mix variance :")
disp("Labour Sub Efficiency variance :")
```

```
50 disp(LSEVs,"Labour Sub Efficiency variance LMVs: ")
51 disp(LSEVu,"Labour Sub Efficiency variance LMVu: ")
52 disp(LSEVs+LSEVu,"Labour Sub Efficiency variance :")
53 disp("Negative variances indicate adverse value   ")
   ;
54 disp("Positive variances indicate favourable value
   ");
```

Scilab code Exa 9.18 Calculate labour variances

```
1  //Exa 18
2  clc;
3  clear;
4  close;
5  // given data :
6  //let s=skilled ;ss=semi skilled; u=unskilled
7  STs=3000;//in weeks
8  STss=1200;//in weeks
9  STu=1800;//in weeks
10 ATs=2560;//in weeks
11 ATss=1600;//in weeks
12 ATu=2240;//in weeks
13 SRs=60;//in Rs/week
14 SRss=36;//in Rs/week
15 SRu=24;//in Rs/week
16 ARs=65;//in Rs/week
17 ARss=40;//in Rs/week
18 ARu=20;//in Rs/week
19 //Labour Cost variance
20 LCVs=(STs*SRs)-(ATs*ARs)
21 LCVss=(STss*SRss)-(ATss*ARss)
22 LCVu=(STu*SRu)-(ATu*ARu)
23 //Labour Efficiency variance
24 LEVs=SRs*(STs-ATs);// in Rs
25 LEVss=SRss*(STss-ATss);// in Rs
```

```
LEVu=SRu*(STu-ATu);// in Rs
//Labour Rate variance
LRVs=ATs*(SRs-ARs);// in Rs
LRVss=ATss*(SRss-ARss);// in Rs
LRVu=ATu*(SRu-ARu);// in Rs
//Labour Mix variance
TAMT=ATs+ATu+ATss;// total of actual mix time
TSMT=STs+STu+STss;// total of standard mix time
RSTs=(STs*TAMT)/TSMT
RSTss=(STss*TAMT)/TSMT
RSTu=(STu*TAMT)/TSMT
LMVs=SRs*(RSTs-ATs);// in Rs
LMVss=SRss*(RSTss-ATss);// in Rs
LMVu=SRu*(RSTu-ATu);// in Rs
//Labour Sub Efficiency variance
LSEVs=SRs*(STs-RSTs);// in Rs
LSEVss=SRss*(STss-RSTss);// in Rs
LSEVu=SRu*(STu-RSTu);// in Rs
disp("Labour Cost variance :")
disp(LCVs,"Labour Cost variance LCVs: ")
disp(LCVss,"Labour Cost variance LCVss: ")
disp(LCVu,"Labour Cost variance LCVu: ")
disp(LCVs+LCVss+LCVu,"Labour Cost variance :")
disp("Labour Efficiency variance :")
disp(LEVs,"Labour Efficiency variance LEVs: ")
disp(LEVss,"Labour Efficiency variance LEVss: ")
disp(LEVu,"Labour Efficiency variance LEVu: ")
disp(LEVs+LEVss+LEVu,"Labour Efficiency variance :")
disp("Labour Rate variance :")
disp(LRVs,"Labour Rate variance LRVs: ")
disp(LRVss,"Labour Rate variance LRVss: ")
disp(LRVu,"Labour Rate variance LRVu: ")
disp(LRVs+LRVss+LRVu,"Labour Rate variance :")
disp("Labour Mix variance :")
disp(LMVs,"Labour Mix variance LMVs: ")
disp(LMVss,"Labour Mix variance LMVss: ")
disp(LMVu,"Labour Mix variance LMVu: ")
disp(LMVs+LMVss+LMVu,"Labour Mix variance :")
```

```
64 disp("Labour Sub Efficiency variance :")
65 disp(LSEVs,"Labour Sub Efficiency variance LMVs: ")
66 disp(LSEVss,"Labour Sub Efficiency variance LMVss: "
   )
67 disp(LSEVu,"Labour Sub Efficiency variance LMVu: ")
68 disp(LSEVs+LSEVss+LSEVu,"Labour Sub Efficiency
   variance :")
69 disp("Negative variances indicate adverse value   ")
   ;
70 disp("Positive variances indicate favourable value
    ");
```

Scilab code Exa 9.19 Calculate labour variances

```
1 //Exa 19
2 clc;
3 clear;
4 close;
5 // given data :
6 ST=60;//in hours
7 AT=40;//in hours
8 SR=120;//in Rs/Hour
9 AR=200;//in Rs/Hour
10 SCperunit=6;// in Rs
11 StdTime=50;//in hours
12 StdYield=1000;//in units
13 AY=1200;//in units
14 //Labour Cost variance
15 LCV=(ST*SR)-(AT*AR)
16 //Labour Efficiency variance
17 LEV=SR*(ST-AT);// in Rs
18 //Labour Rate variance
19 LRV=AT*(SR-AR);// in Rs
20 //Labour Yield variance
21 SY=(StdYield*AT)/StdTime;
```

```
22 LYV=SCperunit*(AY-SY);
23 disp(LCV,"Labour Cost variance : ")
24 disp(LEV,"Labour Efficiency variance : ")
25 disp(LRV,"Labour Rate variance : ")
26 disp(LYV,"Labour Yield variance : ")
27 disp("Negative variances indicate adverse value   ")
      ;
28 disp("Positive variances indicate favourable value
      ");
```

Scilab code Exa 9.21 Calculate labour variances

```
1  //Exa 21
2  clc;
3  clear;
4  close;
5  // given data :
6  //let m=men ;w=women; b=boys
7  STm=960;//in hours
8  STw=480;//in hours
9  STb=320;//in hours
10 ATm=1600;//in hours
11 ATw=400;//in hours
12 ATb=200;//in hours
13 SRm=0.80;//in Rs/hour
14 SRw=0.60;//in Rs/hour
15 SRb=0.40;//in Rs/hour
16 ARm=0.70;//in Rs/hour
17 ARw=0.65;//in Rs/hour
18 ARb=0.30;//in Rs/hour
19 IT=220;//in hours
20 //Labour Cost variance
21 LCVm=(STm*SRm)-(ATm*ARm)
22 LCVw=(STw*SRw)-(ATw*ARw)
23 LCVb=(STb*SRb)-(ATb*ARb)
```

```
//Labour Efficiency variance
LEVm=SRm*(STm-ATm);// in Rs
LEVw=SRw*(STw-ATw);// in Rs
LEVb=SRb*(STb-ATb);// in Rs
//Labour Rate variance
LRVm=ATm*(SRm-ARm);// in Rs
LRVw=ATw*(SRw-ARw);// in Rs
LRVb=ATb*(SRb-ARb);// in Rs
//Labour Mix variance
TAMT=ATm+ATb+ATw-IT;// total of actual mix time
TSMT=STm+STb+STw;// total of standard mix time
RSTm=(STm*TAMT)/TSMT
RSTw=(STw*TAMT)/TSMT
RSTb=(STb*TAMT)/TSMT
LMVm=SRm*(RSTm-ATm);// in Rs
LMVw=SRw*(RSTw-ATw);// in Rs
LMVb=SRb*(RSTb-ATb);// in Rs
//Labour Idle time variance
ITV=IT*((STm*SRm+STw*SRw+STb*SRb)/(STm+STw+STb));//
   in Rs
disp("Labour Cost variance :")
disp(LCVm,"Labour Cost variance LCVm: ")
disp(LCVw,"Labour Cost variance LCVw: ")
disp(LCVb,"Labour Cost variance LCVb: ")
disp(LCVm+LCVw+LCVb,"Labour Cost variance :")
disp("Labour Rate variance :")
disp(LRVm,"Labour Rate variance LRVm: ")
disp(LRVw,"Labour Rate variance LRVw: ")
disp(LRVb,"Labour Rate variance LRVb: ")
disp(LRVm+LRVw+LRVb,"Labour Rate variance :")
disp("Labour Efficiency variance :")
disp(LEVm,"Labour Efficiency variance LEVm: ")
disp(LEVw,"Labour Efficiency variance LEVw: ")
disp(LEVb,"Labour Efficiency variance LEVb: ")
disp(LEVm+LEVw+LEVb,"Labour Efficiency variance :")
disp("Labour Mix variance :")
disp(LMVm,"Labour Mix variance LMVm: ")
disp(LMVw,"Labour Mix variance LMVw: ")
```

```
61 disp(LMVb,"Labour Mix variance LMVb: ")
62 disp(LMVm+LMVw+LMVb,"Labour Mix variance :")
63 disp("Labour Idle time variance :")
64 disp(ITV,"Labour Idle time variance: ")
65 disp("Negative variances indicate adverse value   ")
   ;
66 disp("Positive variances indicate favourable value
    ");
67 //Answer in the book is not correct of LMV
```

Scilab code Exa 9.22 Calculate labour variances

```
1  //Exa22
2  clc;
3  clear;
4  close;
5  //given data :
6  SQ=58000//in sq.ft.
7  AQ=60000//in sq.ft.
8  SP=7//in rupees per sq.ft.
9  AP=6.75//in rupees per sq.ft.
10 ST=174000;//in hours
11 AT=185200;//in hours
12 SR=3.75;//in Rs/Hour
13 AR=3.5;//in Rs/Hour
14 //(i) MCV
15 MCV=(SQ*SP)-(AQ*AP);//in rupees
16 //(ii) MPV
17 MRV=AQ*(SP-AP);//in rupees
18 //(iii) MUV
19 MUV=SP*(SQ-AQ);//in rupees
20 disp(MCV,"MCV=");
21 disp(MRV,"MRV=");
22 disp(MUV,"MUV=");
23 disp("Note :  ")
```

```
disp("Negative variances indicate adverse value   ")
   ;
disp("Positive variances indicate favourable value
     ")
//Labour Cost variance
LCV=(ST*SR)-(AT*AR)
//Labour Efficiency variance
LEV=SR*(ST-AT);// in Rs
//Labour Rate variance
LRV=AT*(SR-AR);// in Rs
disp(LCV,"Labour Cost variance : ")
disp(LRV,"Labour Rate variance : ")
disp(LEV,"Labour Efficiency variance : ")
```