

Scilab Textbook Companion for  
Engineering Economics  
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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.

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# 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  $V_n=V_o*(1+i)^n$ 
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
```



```

2  clc;
3  clear;
4  close;
5  //given data :
6  i=6;//in % per annum
7  //we know rule of 72
8  disp("According to Rule of 72 : doubling period=72/(
      rate of interest)");
9  doublingperiod=72/i;
10 disp(doublingperiod,"Doubling period(in years) : ");
11
12
13 //we know rule of 69
14 disp("According to Rule of 69 : doubling period
      =0.35+69/(rate of interest)");
15 doublingperiod=0.35+69/i;
16 disp(doublingperiod,"Doubling period(in years) : ");

```

---

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

```

1  //Exa3a
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 yearly basis
11 n=t;
12 //formula Vn=Vo*(1+i)^n
13 Vn=Vo*(1+i)^n;
14 disp(Vn," The compound value (in Rs.) : ")
15 //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  $V_n=V_o*(1+i)^n$ 
14  $V_n=V_o*(1+i)^n$ ;
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  $V_n=V_o*(1+i/m)^{(m*n)}$ 
13  $V_n=V_o*(1+i/m)^{(m*n)}$ 
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  $V_n=V_o*(1+i/m)^{(m*n)}$ 
14  $V_n=V_o*(1+i/m)^{(m*n)}$ 
15 disp(Vn," After completing 5 years i.e, on its 6th
    year child will receive(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 //compounding 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 //compounding 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 :

```

```

6 r=9; //in % per annum
7 i=r/100;
8 //compounding is done monthly
9 m=12;
10 //formula EIR=(1+i/m) ^m-1;
11 EIR=(1+i/m) ^m-1;
12 %EIR=100*EIR;
13 disp(%EIR,"Monthly EIR(in %) : ");

```

---

**Scilab code Exa 1.7** Find out rate of interest

```

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

```

---

**Scilab code Exa 1.8** Calculate future value

```

1 //Exa8
2 clc;
3 clear;
4 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  $V_n=R1*(1+i)^{(n-1)}+R2*(1+i)^{(n-2)}$ 
    + ..... +  $R_{n-1}*(1+i)+R_n$ 
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

```

1 //Exa10
2 clc;
3 clear;
4 close;
5 //given data :
6 r=6;//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 //calculating FVA taking  $i=EIR$ ;
13 //formula  $FVA=(A*(1+i)^n-1)/i$ ;
14 A=100;//in Rs
15 n=18;//in years
16 i=EIR;
17  $FVA=(A*((1+i)^n-1))/i$ ;
18 disp(FVA,"Future Value of amount(in Rs) : ");
19 //Note: answer given in the book is not accurate

```

---

#### Scilab code Exa 1.11 Calculate present value

```

1 //Exa11
2 clc;
3 clear;
4 close;
5 //given data :
6 Vn=5000;//in Rs
7 r=10;//in % per annum
8 i=r/100;
9 n=5;//in years
10 //formula for present value  $Vo=Vn/(1+i)^n$ 
11  $Vo=Vn/(1+i)^n$ ;
12 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  $V_0=R_1$ 
     $/(1+i)^{(1)}+R_2/(1+i)^{(2)}+..$ 
12  $V_0=R_1/(1+i)^{(1)}+R_2/(1+i)^{(2)}$ ;
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  $PV=R_1$ 
     $/(1+i)^{(1)}+R_2/(1+i)^{(2)}+.....+R_n/(1+i)^n$ ;
15  $PV=R_1/(1+i)^{(1)}+R_2/(1+i)^{(2)}+R_3/(1+i)^{(3)}+R_4/(1+i)$ 
     $^{4}+R_5/(1+i)^5$ ;
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  $V_0 = \frac{A}{i} \left( \frac{1+i^n}{1+i} - 1 \right)$ 
    *((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  $R = \frac{V_n * i}{(1+i)^n - 1}$ 
    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;

```

```
3 clear;
4 close;
5 //given data :
6 Vo=200000; //in Rs
7 r=8; //in % per annum
8 i=r/100;
9 n=5; //in years
10 //Formula for size of installment can be calculated
    by  $Vo = \frac{A * ((1+i)^n - 1)}{i * (1+i)^n}$ ;
11  $A = \frac{Vo * (i * (1+i)^n)}{(1+i)^n - 1}$ ;
12 disp(A, "Required value(in Rs) : ")
13 //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;
```

```

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 2.3** Find the ammount and compounded interest

```

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

```

)

---

#### Scilab code Exa 2.4 Find the time

```
1 //Exa4
2 clc;
3 clear;
4 close;
5 //given data is :
6 n=3; // in years
7 disp(" Let P=x then A=2*x");
8 disp(" Let r% be the rate of interest");
9 //formula : A=P(1+r/100)^n;
10 //putting values
11 disp(" 2*x=x(1+r/100)^3");
12 disp(" or");
13 disp(" 2=(1+r/100)^3")
14 //on solving this eqn
15 r=((2^(1/3))-1)*100; //in %
16 disp(r," rate is comtuted :")
17 disp(" suppose in n years the amount x will become
18     16*x, then by formula")
19 //16=(1+r/100)^n;
20 n=log(16)/log(1+r/100);
21 disp(" Time is : "+string(n)+" years");
```

---

#### Scilab code Exa 2.5.a Find compound interest reckoned quarterly

```
1 //Exa5(a)
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 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 )
16 //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.")
14 )
```



---

**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

```

```

 9 disp(PayBackPeriod,"Payback period of the project A(
    in years) is : ")
10 //given data for project B:
11 Investment=70000;//in Rs
12 AnnCIF=15000;//in Rs
13 PayBackPeriod=Investment/AnnCIF;//in years
14 disp(PayBackPeriod,"Payback period of the project B(
    in years) is : ")
15 //given data for project C:
16 Investment=32500;//in Rs
17 AnnCIF=9000;//in Rs
18 PayBackPeriod=Investment/AnnCIF;//in years
19 disp(PayBackPeriod,"Payback period of the project C(
    in years) is : ")
20 //given data for project D:
21 Investment=97000;//in Rs
22 AnnCIF=18000;//in Rs
23 PayBackPeriod=Investment/AnnCIF;//in years
24 disp(PayBackPeriod,"Payback period of the project D(
    in years) is : ")
25
26 //given data for project E:
27 Investment=58500;//in Rs
28 AnnCIF=15500;//in Rs
29 PayBackPeriod=Investment/AnnCIF;//in years
30 disp(PayBackPeriod,"Payback period of the project E(
    in years) is : ")

```

---

#### Scilab code Exa 4.4 Calculate payback period

```

1 //Exa 4
2 clc;
3 clear;
4 close;
5 //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;

```

```

3 clear;
4 close;
5 //given data :
6 //Initial Investment
7 InInv=25000;//in Rs.
8 //Scrap Value
9 ScrapValue=5000//in Rs.
10 //Profit before tax and Depreciation
11 P1=5000;//in Rs
12 P2=6000;//in Rs
13 P3=7000;//in Rs
14 P4=8000;//in Rs
15 P5=10000;//in Rs
16 //Total Profit
17 P=P1+P2+P3+P4+P5;//in Rs.
18 //Average Profit
19 AvgP=P/5;//in Rs.
20 //Total Depreciation by straight line method
21 D=4000*5;//in Rs.
22 //Average Depreciation
23 AvgD=D/5;//in Rs
24 //Net income before tax
25 NetIncomebefTax=AvgP-AvgD;
26 //Tax 50%
27 Tax=(NetIncomebefTax*50)/100;// in Rs
28 //Average annual income after tax and depreciation
29 NetInc=NetIncomebefTax-Tax;//in RS.
30 //Average Investment
31 AvgInv=(InInv+ScrapValue)/2;//in Rs.
32 disp(AvgInv,"Average Investment in Rs. : ")
33 //Average rate of return on average Investment
34 ARR=(NetInc/AvgInv)*100;//in %
35 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 IC0=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-IC0; // in Rs
27 disp(NPV,"Net Present Value is : ")
28 //profitability index
29 PVI=P/IC0; // 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/IC0;
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 IC0=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=IC0/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 IC0=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-IC0)/(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 accepted.")

```

---

#### Scilab code Exa 4.13.1 Calculate payback period

```

1 //Exa 13.1
2 clc;

```

```

3 clear;
4 close;
5 //given data :
6 //initial cash outflows
7 IC0=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 //Cumulative 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 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.")
31 disp("Payback period is between 5 and 6 years.")
32 E=5;
33 B=80000-70000;//remaining balance to be recovered
34 C=16000;//cash flow of last payback year
35 PaybackPeriod=E+B/C;
36 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 //Cumulative 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=IC0/10;
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=(IC0-ScrapValue)/10;//in Rs
44 //Average investment
45 AvgInv=(IC0+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 IC0=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-IC0;// 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;

```

```

4  close;
5  //given data :
6  //initial cash outflows
7  IC0=80000;//in Rs.
8  //Total Present Value calculated in Exa13.3
9  P=97922;//in Rs
10 disp(P,"Total present value(in Rs) is : ")
11 //Profitability Index at 10% discount rate
12 PI=P/IC0;//unitless
13 disp(PI,"Profitability Index at 10% discount rate is
      : ")

```

---

**Scilab code Exa 4.13.5** Calculate internal rate of return

```

1  //Exa 13.5
2  clc;
3  clear;
4  close;
5  //given data :
6  //initial cash outflows
7  IC0=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 //Cumulative 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 //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-IC0)/(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 : Cumulative 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

```

```

37 ACI3=IATD3+D; //in RS
38 ACI4=IATD4+D; //in RS
39 ACI5=IATD5+D; //in RS
40 //Project A : Cumulative 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 (ii) calculation of ARR
47 ARR=(IATD/AvgInv)*100; //in %
48 disp(ARR,"Part(ii) Average rate of return (in %) : "
    )

```

---

#### Scilab code Exa 4.14.3 Compute Net present value

```

1 //Exa 14(iii)
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 : Cumulative 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;

```

```

54 PV5=0.621;
55 //Present value for all cash in flows at 10%
    discount Rate
56 P1=ACI1*PV1;// in Rs
57 P2=ACI2*PV2;// in Rs
58 P3=ACI3*PV3;// in Rs
59 P4=ACI4*PV4;// in Rs
60 P5=ACI5*PV5;// in Rs
61 //Total Present Value
62 P=P1+P2+P3+P4+P5;// in Rs
63 //Net Present Value
64 NPV=P-inINV;// in Rs
65 disp(NPV,"Part(iii) Net Present Value is : ")

```

---

#### Scilab code Exa 4.14.4 Calculate profitability index

```

1 //Exa 14(iv)
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 : Cumulative 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



```

1 //Exa 14(v)
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 : Cumulative 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

```

```

69 PV1=0.943;
70 PV2=0.890;
71 PV3=0.840;
72 PV4=0.792;
73 PV5=0.747;
74 //Present value for all cash in flows at 6% discount
    Rate
75 P1=ACI1*PV1;// in Rs
76 P2=ACI2*PV2;// in Rs
77 P3=ACI3*PV3;// in Rs
78 P4=ACI4*PV4;// in Rs
79 P5=ACI5*PV5;// in Rs
80 //Total Present Value
81 P=P1+P2+P3+P4+P5;// in Rs
82 disp("As the total present value of cash inflows at
    6% rate is 50857 RS. is more than the cost of
    investment.")
83 //IRR will be calculated by interpolation of these
    two rates 6% and 8%
84 LDR=6;//in % ;Lower discount rate
85 HDR=8;//in % ;Higher discount rate
86 P1=50857;//in Rs; Present value at lower rate of
    interest
87 P2=47996;//in Rs; Present value at higher rate of
    interest
88 IRR=LDR+((P1-inINV)/(P1-P2))*(HDR-LDR);//in % :
    Internal rate of return
89 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     ;
66 end
67 //calculating annual worth of scrap value
68 AWbenefits2=ScrapValue;
69 AWbenefits=AWbenefits1+AWbenefits2;// total Annual
70     worth of benefits
71 disp(AWbenefits,"Annual worth of the benefits");
72 //calculating Annual worth of cost
73 AWcost1=IC*(1+Irate/100)^life;// the initial cost
74 //calculating annual worth of operating and
75     maintenance cost
76 AWcost2=0;
77 for i=1:30
78     AWcost2=AWcost2+OMC*(1+Irate/100)^(life-i);
79 end
80 AWcost=AWcost1+AWcost2;// total annual worth of cost
81 disp(AWcost,"Annual worth of the cost");
82 BCratio=AWbenefits/AWcost;// formula
83 disp(BCratio,"BCratio using Annual worth is : ")
84 disp("It can be seen that B/C ratio is same.")
85 // Note : answer given in the book is not as much
86     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
30 disp(PWcost,"Presnt worth of the cost");
31 // // using conventional B/C ratio // //
32 BCratio=PWbenefits/PWcost;// formula
33 disp(BCratio,"BCratio using conventional method is :
    ")
34
35 // // using modified B/C ratio // //
36 BCratio=(PWbenefits-PWcost2)/IC;// formula
37 disp(BCratio,"BCratio using conventional method is :
    ")
```

---



# Chapter 8

## Product Process and Operation Costing

Scilab code Exa 8.1 Process account and Abnormal Loss Account

```
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-NTLoss;//in Units
13 CostPerUnit=(CostOfProduction-50*10-2*NTLoss)/
    UnitsProduced;//in Rs.
14 AbnormalLoss=ActualLoss-NTLoss;//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 TransferredNextProcess=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
              4600              5250              650
              35000              0.15 ");
27 disp(" Overhead
              3100              3500              400
              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("
        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
      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
      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");
52 disp("");
53 disp("Abnormal Gain Account");
54 disp("
      Amount          Units          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 Profit 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 Amount
        Equivalent 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
    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;

```

```

4 close;
5 disp("
      Amount                Units");
6 disp(" Production          Units      %
      Equivalent           %         Equivalent");
7 disp("                                Completion
      Units      Completion  Units");
8 disp(" Finished & Transferred 8000      100%
      8000      100%      8000 ");
9 disp(" Closing work-in-progress 2000      100%
      2000      50%      1000");
10 disp(" Total Production      10000
      10000                                9000");
11 disp("");
12 disp(" Statement of cost");
13 disp("                                Material
      Labour      Overhead      Total");
14 disp("                                Rs.
      Rs.      Rs.      Rs.");
15 disp(" Cost of opening work-in-progress 7500
      3000      1500      12000");
16 disp(" Cost in and during the process 100000
      78000      39000      217000");
17 disp("                                Total cost 107500
      81000      40500      229000");
18 disp(" Equivalent units 10000
      9000      9000");
19 disp(" Cost per unit 10.75
      9.00      4.50      24.25");
20 disp("");
21 disp(8000*24.25,"(a) Value of output transferred :
      8000 units @ Rs. 24.25 is ");
22 disp("(b) Value of Closing work-in-progress");
23 disp(2000*10.75,"Material      2000 units @ 10.75 :");
      ;
24 disp(1000*9.00,"Labour      1000 units @ 9.00 :");
25 disp(1000*4.50,"Overhead      1000 units @ 4.50:");
26 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 accooount      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
    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 Transferred) 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 Transferred) 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)
By closing Stock
")
10000
3000
26 disp("To Material
By Finished stock(o/p Transferred)
15000");
1000
27 disp("To Labour
4000");
28 disp("To Profit(20% on transfer price)
*3000");
29 disp("
18000
18000");

30 disp("");
31 disp("Finished Stock Account");
32 disp("
Amount
Amount");
33 disp("
Rs.
Rs. ");
34 disp("To Process C(Output Recieved)
By Sales
")
15000
18000
35 disp("To Profit
By Closing Stock
5000
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("
          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(" Ratio/100 for
           each ");
8 disp(" cost of final Labour cost
           7/2 % % ");
9 disp(" Operation Input Rejects Output
           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

```

```

7 value=9000;//rupees for material purchased
8 SQ=25;
9 stdoutput=1;//in tonnes
10 actualoutput=80;//in tonnes
11 //SQ for actual output
12 SQa=(SQ*actualoutput)/stdoutput;
13 //Material consumed or AQ
14 AQ=3000+100-600;//opening stock=100;Purchased=3000;
    closing stock=600;
15 SP=2;//rupees per unit
16 AP=value/quantity;//rupees per unit
17 //(i) MUV
18 MUV=SP*(SQa-AQ);//in rupees
19 //(ii) MPV
20 MPV=AQ*(SP-AP);//in rupees
21 //(iii) MCV
22 MCV=(SQa*SP)-(AQ*AP);//in rupees
23 disp(MUV,"MUV=");
24 disp(MPV,"MPV=");
25 disp(MCV,"MCV=");
26 disp(" Note : ");
27 disp(" Negative variances indicate adverse value ")
    ;
28 disp(" Positive variances indicate favourable value
    ");

```

---

### Scilab code Exa 9.5 Calculate material variances

```

1 //Exa3
2 clc;
3 clear;
4 close;
5 //given data :
6 SQa=100//in Kgs
7 AQa=90//in Kgs

```

```

8 SPa=2//in rupees per Kgs
9 APa=2.20//in rupees per Kgs
10 SQb=50//in kg
11 AQb=60//in Kg
12 SPb=5//in rupees per Kg
13 APb=4.50//in rupees per Kg
14 //(i) MUVa
15 MUVa=SPa*(SQa-AQa);//in rupees
16 //(ii) MPVa
17 MPVa=AQa*(SPa-APa);//in rupees
18 //(iii) MCVa
19 MCVa=(SQa*SPa)-(AQa*APa);//in rupees
20
21 //(i) MUVb
22 MUVb=SPb*(SQb-AQb);//in rupees
23 //(ii) MPVb
24 MPVb=AQb*(SPb-APb);//in rupees
25 //(iii) MCVb
26 MCVb=(SQb*SPb)-(AQb*APb);//in rupees
27 RSQa=(SQa*150)/(SQa+SQb);
28 RSQb=(SQb*150)/(SQa+SQb);
29 //(iv) MMVa
30 MMVa=SPa*(RSQa-AQa);
31 //(iv) MMVb
32 MMVb=SPb*(RSQb-AQb);
33 //(v) MSUVa
34 MSUVa=SPa*(SQa-RSQa);
35 //(v) MSUVb
36 MSUVb=SPb*(SQb-RSQb);
37 //material A
38 disp("Variances for material A")
39 disp(MUVa,"MUV=");
40 disp(MPVa,"MPV=");
41 disp(MCVa,"MCV=");
42 disp(MMVa,"MMV=");
43 disp(MSUVa,"MSUV=")
44 //material B
45 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

```

```

23 MUVb=SPb*(SQb-AQb); //in rupees
24 //(4) Material mix variance
25 RSQa=(SQa*180)/(150);
26 RSQb=(SQb*180)/(150);
27 MMVa=SPa*(RSQa-AQa);
28 MMVb=SPb*(RSQb-AQb);
29 //(4) Material sub usage variance
30 MSUVa=SPa*(SQa-RSQa);
31 MSUVb=SPb*(SQb-RSQb);
32 //material A
33 disp(" Variances for material A")
34 disp(MUVa,"MUV=");
35 disp(MPVa,"MPV=");
36 disp(MCVa,"MCV=");
37 disp(MMVa,"MMV=");
38 disp(MSUVa,"MSUV=")
39 //material B
40 disp(" Variances for material B")
41 disp(MUVb,"MUV=");
42 disp(MPVb,"MPV=");
43 disp(MCVb,"MCV=");
44 disp(MMVb,"MMV=");
45 disp(MSUVb,"MSUV=")
46 disp(" Note : ")
47 disp(" Negative variances indicate adverse value ")
    ;
48 disp(" Positive variances indicate favourable value ")
    )

```

---

**Scilab code Exa 9.7.a** Calculate material cost variances

```

1 //Exa 7(i)
2 clc;
3 clear;
4 close;

```

```

5 // given data :
6 //mix ratio is not same
7 SQa=10//in Kgs
8 AQa=10//in Kgs
9 SPa=8//in rupees per Kgs
10 APa=7//in rupees per Kgs
11 SQb=8//in kg
12 AQb=9//in Kg
13 SPb=6//in rupees per Kg
14 APb=7//in rupees per Kg
15 SQc=4//in kg
16 AQc=5//in Kg
17 SPc=12//in rupees per Kg
18 APc=11//in rupees per Kg
19 //(1) Material cost variance
20 MCVa=(SQa*SPa)-(AQa*APa);//in rupees
21 MCVb=(SQb*SPb)-(AQb*APb);//in rupees
22 MCVc=(SQc*SPc)-(AQc*APc);//in rupees
23 disp(MCVa,"MCVa=");
24 disp(MCVb,"MCVb=");
25 disp(MCVc,"MCVc=");
26 disp("Note : ")
27 disp("Negative variances indicate adverse value ")
    ;
28 disp("Positive variances indicate favourable value
    ")

```

---

**Scilab code Exa 9.7.b** Calculate material usage variance

```

1 //Exa 7(ii)
2 clc;
3 clear;
4 close;
5 // given data :
6 //mix ratio is not same

```

```

7  SQa=10//in Kgs
8  AQa=10//in Kgs
9  SPa=8//in rupees per Kgs
10 APa=7//in rupees per Kgs
11 SQb=8//in kg
12 AQb=9//in Kg
13 SPb=6//in rupees per Kg
14 APb=7//in rupees per Kg
15 SQc=4//in kg
16 AQc=5//in Kg
17 SPc=12//in rupees per Kg
18 APc=11//in rupees per Kg
19 //(2) Material usage variance
20 MUVa=SPa*(SQa-AQa);//in rupees
21 MUVb=SPb*(SQb-AQb);//in rupees
22 MUVc=SPc*(SQc-AQc);//in rupees
23 disp(MUVa,"MUVa=");
24 disp(MUVb,"MUVb=");
25 disp(MUVc,"MUVc=");
26 disp("Note : ")
27 disp("Negative variances indicate adverse value ")
    ;
28 disp("Positive variances indicate favourable value
    ");

```

---

**Scilab code Exa 9.7.c** Calculate material price variance

```

1 //Exa 7(iii)
2 clc;
3 clear;
4 close;
5 // given data :
6 //mix ratio is not same
7 SQa=10//in Kgs
8 AQa=10//in Kgs

```

```

 9 SPa=8//in rupees per Kgs
10 APa=7//in rupees per Kgs
11 SQb=8//in kg
12 AQb=9//in Kg
13 SPb=6//in rupees per Kg
14 APb=7//in rupees per Kg
15 SQc=4//in kg
16 AQc=5//in Kg
17 SPc=12//in rupees per Kg
18 APc=11//in rupees per Kg
19 //(2) Material price variance
20 MPVb=AQb*(SPb-APb);//in rupees
21 MPVa=AQa*(SPa-APa);//in rupees
22 MPVc=AQc*(SPc-APc);//in rupees
23 disp(MPVa,"MPVa=");
24 disp(MPVb,"MPVb=");
25 disp(MPVc,"MPVc=");
26 disp("Note : ")
27 disp("Negative variances indicate adverse value ")
    ;
28 disp("Positive variances indicate favourable value
    ")

```

---

#### Scilab code Exa 9.7.d Calculate material mix variance

```

1 //Exa 7(iv)
2 clc;
3 clear;
4 close;
5 // given data :
6 //mix ratio is not same
7 SQa=10//in Kgs
8 AQa=10//in Kgs
9 SPa=8//in rupees per Kgs
10 APa=7//in rupees per Kgs

```

```

11 SQb=8//in kg
12 AQb=9//in Kg
13 SPb=6//in rupees per Kg
14 APb=7//in rupees per Kg
15 SQc=4//in kg
16 AQc=5//in Kg
17 SPc=12//in rupees per Kg
18 APc=11//in rupees per Kg
19 //(4) Material mix variance
20 RSQa=(SQa*24)/(22);
21 RSQb=(SQb*24)/(22);
22 RSQc=(SQc*24)/(22)
23 MMVa=SPa*(RSQa-AQa);
24 MMVb=SPb*(RSQb-AQb);
25 MMVc=SPc*(RSQc-AQc);
26 disp(MMVa,"MMV=");
27 disp(MMVb,"MMV=");
28 disp(MMVc,"MMV=");
29 disp(" Note : ")
30 disp(" Negative variances indicate adverse value ")
    ;
31 disp(" Positive variances indicate favourable value
    ");

```

---

**Scilab code Exa 9.7.e** Calculate material sub usage variances

```

1 //Exa 7(v)
2 clc;
3 clear;
4 close;
5 // given data :
6 //mix ratio is not same
7 SQa=10//in Kgs
8 AQa=10//in Kgs
9 SPa=8//in rupees per Kgs

```

```

10 APa=7//in rupees per Kgs
11 SQb=8//in kg
12 AQb=9//in Kg
13 SPb=6//in rupees per Kg
14 APb=7//in rupees per Kg
15 SQc=4//in kg
16 AQc=5//in Kg
17 SPc=12//in rupees per Kg
18 APc=11//in rupees per Kg
19 //(5) Material sub usage variance
20 MSUVa=SPa*(SQa-RSQa);
21 MSUVb=SPb*(SQb-RSQb);
22 MSUVc=SPc*(SQc-RSQc);
23 disp(MSUVa,"MSUV=");
24 disp(MSUVb,"MSUV=");
25 disp(MSUVc,"MSUV=");
26 disp("Note : ")
27 disp("Negative variances indicate adverse value ")
    ;
28 disp("Positive variances indicate favourable value
    ");

```

---

### Scilab code Exa 9.8 Calculate material variances

```

1 //Exa 8
2 clc;
3 clear;
4 close;
5 // given data :
6 //mix ratio is not same
7 SQx=54//in Kgs
8 AQx=40//in Kgs
9 SPx=6//in rupees per Kgs
10 APx=6//in rupees per Kgs
11 SQy=44//in kg

```

```

12 AQy=50//in Kg
13 SPy=5//in rupees per Kg
14 APy=5//in rupees per Kg
15 SQz=20//in kg
16 AQz=24//in Kg
17 SPz=7//in rupees per Kg
18 APz=7//in rupees per Kg
19 //(1) Material cost variance
20 MCVx=(SQx*SPx)-(AQx*APx);//in rupees
21 MCVy=(SQy*SPy)-(AQy*APy);//in rupees
22 MCVz=(SQz*SPz)-(AQz*APz);//in rupees
23 //(2) Material price variance
24 MPVy=AQy*(SPy-APy);//in rupees
25 MPVx=AQx*(SPx-APx);//in rupees
26 MPVz=AQz*(SPz-APz);//in rupees
27 //(3) Material usage variance
28 MUVx=SPx*(SQx-AQx);//in rupees
29 MUVy=SPy*(SQy-AQy);//in rupees
30 MUVz=SPz*(SQz-AQz);//in rupees
31 //(4) Material mix variance
32 RSQx=(SQx*114)/(118);
33 RSQy=(SQy*114)/(118);
34 RSQz=(SQz*114)/(118)
35 MMVx=SPx*(RSQx-AQx);
36 MMVy=SPy*(RSQy-AQy);
37 MMVz=SPz*(RSQz-AQz);
38 //(5) Material sub usage variance
39 MSUVx=SPx*(SQx-RSQx);
40 MSUVy=SPy*(SQy-RSQy);
41 MSUVz=SPz*(SQz-RSQz);
42 //material Cost variance
43 disp("material Cost variances :")
44 disp(MCVx,"MCVx=");
45 disp(MCVy,"MCVy=");
46 disp(MCVz,"MCVz=");
47 //material Usage variance
48 disp("material Usage variances :")
49 disp(MUVx,"MUVx=");

```



```

50 disp(MUVy,"MUVy=");
51 disp(MUVz,"MUVz=");
52 //material Price variance
53 disp("material Price variances : ")
54 disp(MPVx,"MPVx=");
55 disp(MPVy,"MPVy=");
56 disp(MPVz,"MPVz=");
57 disp("As standard prices and atual prices are same,
      hence there is no material Price variance")
58 //material Mix variance
59 disp("material mix variances :")
60 disp(MMVx,"MMVx=");
61 disp(MMVy,"MMVy=");
62 disp(MMVz,"MMVz=");
63 //material Sub usage variance
64 disp("material sub Usage variances :")
65 disp(MSUVx,"MSUVx=")
66 disp(MSUVy,"MSUVy=")
67 disp(MSUVz,"MSUVz=")
68 disp("Note : ")
69 disp("Negative variances indicate adverse value ")
      ;
70 disp("Positive variances indicate favourable value
      ")

```

---

### Scilab code Exa 9.9 Calculate material variances

```

1 //Exa 9
2 clc;
3 clear;
4 close;
5 // given data :
6 SQx1=120//in Kgs
7 AQx=112//in Kgs
8 SPx=5//in rupees per Kgs

```

```

9 APx=5//in rupees per Kgs
10 SQy1=80//in kg
11 AQy=88//in Kg
12 SPy=10//in rupees per Kg
13 APy=10//in rupees per Kg
14 Loss=30;//in %
15 //calculation of SQ for actual output
16 StandardYield=(SQx1+SQy1)-((SQx1+SQy1)*Loss)/100;//
    in kg
17 ActualYield=150;//in kg
18 SQx=(SQx1*ActualYield)/StandardYield;// in kg
19 SQy=(SQy1*ActualYield)/StandardYield;// in kg
20 //(1) Material cost variance
21 MCVx=(SQx*SPx)-(AQx*APx);//in rupees
22 MCVy=(SQy*SPy)-(AQy*APy);//in rupees
23 //(2) Material price variance
24 MPVy=AQy*(SPy-APy);//in rupees
25 MPVx=AQx*(SPx-APx);//in rupees
26 //(3) Material usage variance
27 MUVx=SPx*(SQx-AQx);//in rupees
28 MUVy=SPy*(SQy-AQy);//in rupees
29 //(4) Material mix variance
30 RSQx=(SQx*200)/(200);
31 RSQy=(SQy*200)/(200);
32 MMVx=SPx*(SQx1-AQx);
33 MMVy=SPy*(SQy1-AQy);
34 //(5) Material Yield variance
35 TotalSC=SQx1*SPx+SQy1*SPy;// in Rs
36 TotalSQ=SQx1+SQy1-((SQx1+SQy1)*Loss)/100;//in Kg
37 SCperunit=TotalSC/TotalSQ;// in Rs
38 RSY=(StandardYield*(200))/(200);
39 MYV=SCperunit*(ActualYield-RSY);
40 //material Cost variance
41 disp("material Cost variances :")
42 disp(MCVx,"MCVx=");
43 disp(MCVy,"MCVy=");
44 disp(MCVx+MCVy,"Total MCV=");
45 //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

```

```

9  APa=3.2//in rupees per Kgs
10 SQb1=250//in kg
11 AQb=300//in Kg
12 SPb=5//in rupees per Kg
13 APb=4.67//in rupees per Kg
14 SQc1=300//in kg
15 AQc=350//in Kg
16 SPc=6//in rupees per Kg
17 APc=6.43//in rupees per Kg
18
19 Loss=250;//in Kg
20 //calculation of SQ for actual output
21 StandardYield=(SQa1+SQb1+SQc1)-Loss;//in kg
22 ActualYield=500;//in kg
23 SQa=(SQa1*ActualYield)/StandardYield;// in kg
24 SQb=(SQb1*ActualYield)/StandardYield;// in kg
25 SQc=(SQc1*ActualYield)/StandardYield;// in kg
26 //(1) Material cost variance
27 MCVa=(SQa1*SPa)-(AQa*APa);//in rupees
28 MCVb=(SQb1*SPb)-(AQb*APb);//in rupees
29 MCVc=(SQc1*SPc)-(AQc*APc);//in rupees
30 //(2) Material price variance
31 MPVb=AQb*(SPb-APb);//in rupees
32 MPVa=AQa*(SPa-APa);//in rupees
33 MPVc=AQc*(SPc-APc);//in rupees
34 //(3) Material usage variance
35 MUVa=SPa*(SQa1-AQa);//in rupees
36 MUVb=SPb*(SQb1-AQb);//in rupees
37 MUVc=SPc*(SQc1-AQc);//in rupees
38 //(4) Material mix variance
39 RSQa=(SQa1*900)/(750);
40 RSQb=(SQb1*900)/(750);
41 RSQc=(SQc1*900)/(750);
42 MMVa=SPa*(RSQa-AQa);
43 MMVb=SPb*(RSQb-AQb);
44 MMVc=SPc*(RSQc-AQc);
45 //(5) Material Yield variance
46 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;

```

```

5 // given data :
6 ST=10;//in hours
7 AT=8;//in hours
8 SR=9;//in Rs/Hour
9 AR=10;//in Rs/Hour
10 //Labour Cost variance
11 LCV=(ST*SR)-(AT*AR)
12 //Labour Efficiency variance
13 LEV=SR*(ST-AT);// in Rs
14 //Labour Rate variance
15 LRV=AT*(SR-AR);// in Rs
16 disp(LCV,"Labour Cost variance : ")
17 disp(LEV,"Labour Efficiency variance : ")
18 disp(LRV,"Labour Rate variance : ")
19 disp("Negative variances indicate adverse value  ")
    ;
20 disp("Positive variances indicate favourable value
    ");

```

---

### Scilab code Exa 9.13 Calculate labour variances

```

1 //Exa 13
2 clc;
3 clear;
4 close;
5 // given data :
6 ST=4300;//in hours
7 AT=4000;//in hours
8 SR=3;//in Rs/Hour
9 GWP=16400;//in RS
10 AR=GWP/AT;//in Rs/Hour
11 //Labour Cost variance
12 LCV=(ST*SR)-(AT*AR)
13 //Labour Efficiency variance
14 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

```

```

12 ARs=0.40; //in Rs/Hour
13 ARu=0.50; //in Rs/Hour
14 //Labour Cost variance
15 LCVs=(STs*SRs)-(ATs*ARs)
16 LCVu=(STu*SRu)-(ATu*ARu)
17 //Labour Efficiency variance
18 LEVs=SRs*(STs-ATs); // in Rs
19 LEVu=SRu*(STu-ATu); // in Rs
20 //Labour Rate variance
21 LRVs=ATs*(SRs-ARs); // in Rs
22 LRVu=ATu*(SRu-ARu); // in Rs
23 //Labour Mix variance
24 TAMT=ATs+ATu; // total of actual mix time
25 TSMT=STs+STu; // total of standard mix time
26 RSTs=(STs*TAMT)/TSMT
27 RSTu=(STu*TAMT)/TSMT
28 LMVs=SRs*(RSTs-ATs); // in Rs
29 LMVu=SRu*(RSTu-ATu); // in Rs
30 //Labour Sub Efficiency variance
31 LSEVs=SRs*(STs-RSTs); // in Rs
32 LSEVu=SRu*(STu-RSTu); // in Rs
33 disp("Labour Cost variance :")
34 disp(LCVs,"Labour Cost variance LCVs: ")
35 disp(LCVu,"Labour Cost variance LCVu: ")
36 disp(LCVs+LCVu,"Labour Cost variance :")
37 disp("Labour Efficiency variance :")
38 disp(LEVs,"Labour Efficiency variance LEVs: ")
39 disp(LEVu,"Labour Efficiency variance LEVu: ")
40 disp(LEVs+LEVu,"Labour Efficiency variance :")
41 disp("Labour Rate variance :")
42 disp(LRVs,"Labour Rate variance LRVs: ")
43 disp(LRVu,"Labour Rate variance LRVu: ")
44 disp(LRVs+LRVu,"Labour Rate variance :")
45 disp("Labour Mix variance :")
46 disp(LMVs,"Labour Mix variance LMVs: ")
47 disp(LMVu,"Labour Mix variance LMVu: ")
48 disp(LMVs+LMVu,"Labour Mix variance :")
49 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

```

```

26 LEVu=SRu*(STu-ATu); // in Rs
27 //Labour Rate variance
28 LRVs=ATs*(SRs-ARs); // in Rs
29 LRVss=ATss*(SRss-ARss); // in Rs
30 LRVu=ATu*(SRu-ARu); // in Rs
31 //Labour Mix variance
32 TAMT=ATs+ATu+ATss; // total of actual mix time
33 TSMT=STs+STu+STss; // total of standard mix time
34 RSTs=(STs*TAMT)/TSMT
35 RSTss=(STss*TAMT)/TSMT
36 RSTu=(STu*TAMT)/TSMT
37 LMVs=SRs*(RSTs-ATs); // in Rs
38 LMVss=SRss*(RSTss-ATss); // in Rs
39 LMVu=SRu*(RSTu-ATu); // in Rs
40 //Labour Sub Efficiency variance
41 LSEVs=SRs*(STs-RSTs); // in Rs
42 LSEVss=SRss*(STss-RSTss); // in Rs
43 LSEVu=SRu*(STu-RSTu); // in Rs
44 disp("Labour Cost variance :")
45 disp(LCVs,"Labour Cost variance LCVs: ")
46 disp(LCVss,"Labour Cost variance LCVss: ")
47 disp(LCVu,"Labour Cost variance LCVu: ")
48 disp(LCVs+LCVss+LCVu,"Labour Cost variance :")
49 disp("Labour Efficiency variance :")
50 disp(LEVs,"Labour Efficiency variance LEVs: ")
51 disp(LEVss,"Labour Efficiency variance LEVss: ")
52 disp(LEVu,"Labour Efficiency variance LEVu: ")
53 disp(LEVs+LEVss+LEVu,"Labour Efficiency variance :")
54 disp("Labour Rate variance :")
55 disp(LRVs,"Labour Rate variance LRVs: ")
56 disp(LRVss,"Labour Rate variance LRVss: ")
57 disp(LRVu,"Labour Rate variance LRVu: ")
58 disp(LRVs+LRVss+LRVu,"Labour Rate variance :")
59 disp("Labour Mix variance :")
60 disp(LMVs,"Labour Mix variance LMVs: ")
61 disp(LMVss,"Labour Mix variance LMVss: ")
62 disp(LMVu,"Labour Mix variance LMVu: ")
63 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)

```

```

24 //Labour Efficiency variance
25 LEVm=SRm*(STm-ATm); // in Rs
26 LEVw=SRw*(STw-ATw); // in Rs
27 LEVb=SRb*(STb-ATb); // in Rs
28 //Labour Rate variance
29 LRVm=ATm*(SRm-ARm); // in Rs
30 LRVw=ATw*(SRw-ARw); // in Rs
31 LRVb=ATb*(SRb-ARb); // in Rs
32 //Labour Mix variance
33 TAmT=ATm+ATb+ATw-IT; // total of actual mix time
34 TSMT=STm+STb+STw; // total of standard mix time
35 RSTm=(STm*TAmT)/TSMT
36 RSTw=(STw*TAmT)/TSMT
37 RSTb=(STb*TAmT)/TSMT
38 LMVm=SRm*(RSTm-ATm); // in Rs
39 LMVw=SRw*(RSTw-ATw); // in Rs
40 LMVb=SRb*(RSTb-ATb); // in Rs
41 //Labour Idle time variance
42 ITV=IT*((STm*SRm+STw*SRw+STb*SRb)/(STm+STw+STb)); //
    in Rs
43 disp("Labour Cost variance :")
44 disp(LCVm,"Labour Cost variance LCVm: ")
45 disp(LCVw,"Labour Cost variance LCVw: ")
46 disp(LCVb,"Labour Cost variance LCVb: ")
47 disp(LCVm+LCVw+LCVb,"Labour Cost variance :")
48 disp("Labour Rate variance :")
49 disp(LRVm,"Labour Rate variance LRVm: ")
50 disp(LRVw,"Labour Rate variance LRVw: ")
51 disp(LRVb,"Labour Rate variance LRVb: ")
52 disp(LRVm+LRVw+LRVb,"Labour Rate variance :")
53 disp("Labour Efficiency variance :")
54 disp(LEVm,"Labour Efficiency variance LEVm: ")
55 disp(LEVw,"Labour Efficiency variance LEVw: ")
56 disp(LEVb,"Labour Efficiency variance LEVb: ")
57 disp(LEVm+LEVw+LEVb,"Labour Efficiency variance :")
58 disp("Labour Mix variance :")
59 disp(LMVm,"Labour Mix variance LMVm: ")
60 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 : ")

```

```
24 disp("Negative variances indicate adverse value  ")
    ;
25 disp("Positive variances indicate favourable value
    ")
26 //Labour Cost variance
27 LCV=(ST*SR)-(AT*AR)
28 //Labour Efficiency variance
29 LEV=SR*(ST-AT); // in Rs
30 //Labour Rate variance
31 LRV=AT*(SR-AR); // in Rs
32 disp(LCV,"Labour Cost variance : ")
33 disp(LRV,"Labour Rate variance : ")
34 disp(LEV,"Labour Efficiency variance : ")
```

---