**UNIVERSITY OF ENGINEERING AND**

**TECHNOLOGY LAHORE**



**Assignment # 3**

**Economic Dispatch using Dynamic Programming**

**Course Title: Advanced Power System Operation and Control**

**Course Code: EE 641**

**Submitted to:**

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**Problem Statement**

Three generator units with non-convex input output curves must be optimally scheduled to meet a load demand of D = 310 MW. The costs for different power levels are shown in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Power Levels (MW) | Costs ($/h) | | |
|  |  |  |  |
| 0 |  |  |  |
| 50 | 810 | 750 | 806 |
| 75 | 1355 | 1155 | 1108.5 |
| 100 | 1460 | 1360 | 1411 |
| 125 | 1772.5 | 1655 | 1704.5 |
| 150 | 208.5 | 1950 | 1998 |
| 175 | 2427.5 |  | 2358 |
| 200 | 2760 |  |  |
| 225 |  |  |  |

**MATLAB Code**

clc;clear all;

f2=ones(18,9).\*inf;

f2min=ones(18,1).\*inf;

P1min=zeros(18,1);

P2min=zeros(18,1);

D12=zeros(18,1);

Ans12=zeros(18,1);

f3=ones(27,9).\*inf;

f3min=ones(27,1).\*inf;

P3min=zeros(27,1);

D123=zeros(27,1);

Ans123=zeros(27,1);

Powers=[0;50;75;100;125;150;175;200;225];

Costs=[ inf inf inf;

810 750 806;

1355 1155 1108.5;

1460 1360 1411;

1772.5 1655 1704.5;

2085 1950 1998;

2427.5 inf 2358;

2760 inf inf;

inf inf inf];

i1min=2;i2min=2;i3min=2;

i1max=8;i2max=6;i3max=7;

D12min=100;D12max=350;

D123min=300;D123max=325;

for c=i2min:i2max

for r=i1min:i1max

sumP=Powers(r)+Powers(c);

if (sumP>=D12min)&&(sumP<=D12max)

f2(r+c,c)=Costs(r,1)+Costs(c,2);

if (f2(r+c,c)==min(f2(r+c,:)))&&(f2(r+c,c)~=inf)

f2min(r+c,1)=min(f2(r+c,:));

P2min(r+c,1)=Powers(c,1);

P1min(r+c,1)=Powers(r,1);

D12(r+c,1)=Powers(r)+Powers(c);

Ans12(r+c,1)=D12(r+c,1);

Ans12(r+c,2)=f2min(r+c,1);

Ans12(r+c,3)=P2min(r+c,1);

Ans12(r+c,4)=P1min(r+c,1);

end

end

end

end

for c=i3min:i3max

for r=1:length(f2min)

sumP=D12(r)+Powers(c);

if (sumP>=D123min)&&(sumP<=D123max)

f3(r+c,c)=f2min(r,1)+Costs(c,3);

if (f3(r+c,c)==min(f3(r+c,:)))&&(f3(r+c,c)~=inf)

f3min(r+c,1)=min(f3(r+c,:));

P3min(r+c,1)=Powers(c,1);

D123(r+c,1)=D12(r)+Powers(c,1);

Ans123(r+c,1)=D123(r+c,1);

Ans123(r+c,2)=f3min(r+c,1);

Ans123(r+c,3)=P3min(r+c,1);

Ans123(r+c,4)=P2min(r,1);

Ans123(r+c,5)=P1min(r,1);

end

end

end

end

Ans12

Ans123