

1. Obtain the priority list of unit commitment using full load average production cost for the power demand of 500 MW.

$$H_1 = 510 + 7.2 PG_1 + 0.00142 PG_1^2 \text{ Mw/hr}$$

$$H_2 = 310 + 7.85 PG_2 + 0.00194 PG_2^2 \text{ Mw/hr}$$

$$H_3 = 78 + 7.94 PG_3 + 0.00482 PG_3^2 \text{ Mw/hr}$$

Unit No.	Loading limit		Fuel cost
1	150	600	1.1
2	100	400	1
3	50	200	1.2

Solution

$$FLPAC_1 = \frac{1.1 ((0.00142 \times 600^2) + (7.2 \times 600) + 510)}{600} = 9.79$$

$$FLPAC_2 = \frac{1 ((0.00194 \times 400^2) + (7.85 \times 400) + 310)}{400} = 9.4$$

$$FLPAC_3 = \frac{1.2 ((0.00482 \times 2) + (7.94 \times 200) + 78)}{200} = 11$$

Priority List

Unit No.	FLPAC	Min	Max
2	9.4	100	400
1	9.79	150	600
3	11	50	200

Unit Commitment:

Combination	Min	Max
2+1+3	300	1200
2+1	250	1000
2	100	400

To meet the load demand of 500MW units 2 & 1 should be committed.

2. Obtain priority list and find the unit commitment for the following units

$$F_1 = 392.7 + 5.544 PG_1 + 0.001093 PG_1^2 \text{ Rs/hr}$$

$$F_2 = 217 + 5.495 PG_2 + 0.001358 PG_2^2 \text{ Rs/hr}$$

$$F_3 = 65.5 + 16.695 PG_3 + 0.004049 PG_3^2 \text{ Rs/hr}$$

Gen Limits:

$$150 \text{ MW} < PG_1 < 600 \text{ MW}; K_1 = 1.1$$

$$100 < PG_2 < 400 \text{ MW}; K_2 = 1.2$$

$$50 < PG_3 < 200 \text{ MW}; K_3 = 1.0$$

$$PD = 900 \text{ MW.}$$

Solution

$$FLPAC_1 = \frac{1.1 ((0.001093 \times 600^2) + (5.544 \times 600) + 392.7)}{600} = 7.53$$

$$FLPAC_2 = \frac{1.2 ((0.001358 \times 400^2) + (5.495 \times 400) + 217)}{400} = 7.89$$

$$FLPAC_3 = \frac{1 ((0.004049 \times 2) + (16.695 \times 200) + 65.5)}{200} = 7.83$$

Priority List

Unit No.	FLPAC	Min	Max
1	7.53	150	600
3	7.83	50	200
2	7.89	100	400

Unit Commitment:

Combination	Min	Max
1+3+2	300	1200
1+3	200	800
1	150	600

To meet the load of 900 MW all the units should be in operation.