**Problem – D (Assembly) 🡪 DATA**

**Test Instance-1:** TAS1C1D1 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-2:** TAS1C1D2 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

//

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-3:** TAS1C1D3 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

//

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-4:** TAS1C1D4 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-5:** TAS1C1D5 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

//

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-6:** TAS1C1D6 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-7:** TAS1C1D7 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

//

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-8:** TAS1C1D8 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-9:** TAS1C1D9 (Test Assembly Setup-Profile\_1 Capacity-Profile\_1 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [100.0000,200.0000,378.9474,326.3158,336.8421,347.3684];

**Test Instance-10:** TAS1C2D1 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-11:** TAS1C2D2 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-12:** TAS1C2D3 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-13:** TAS1C2D4 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-14:** TAS1C2D5 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-15:** TAS1C2D6 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-16:** TAS1C2D7 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-17:** TAS1C2D8 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-18:** TAS1C2D9 (Test Assembly Setup-Profile\_1 Capacity-Profile\_2 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [126.6667,253.3333,480.0000,413.3333,426.6667,440.0000];

**Test Instance-19:** TAS1C3D1 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-20:** TAS1C3D2 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-21:** TAS1C3D3 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-22:** TAS1C3D4 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-23:** TAS1C3D5 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-24:** TAS1C3D6 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-25:** TAS1C3D7 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-26:** TAS1C3D8 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-27:** TAS1C3D9 (Test Assembly Setup-Profile\_1 Capacity-Profile\_3 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [172.7273,345.4545,654.5454,563.6364,581.8182,600.0000];

**Test Instance-28:** TAS1C4D1 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-29:** TAS1C4D2 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-30:** TAS1C4D3 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-31:** TAS1C4D4 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-32:** TAS1C4D5 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-33:** TAS1C4D6 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-34:** TAS1C4D7 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-35:** TAS1C4D8 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-36:** TAS1C4D9 (Test Assembly Setup-Profile\_1 Capacity-Profile\_4 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [100.0000,200.0000,480.0000,413.3333,581.8182,600.0000];

**Test Instance-37:** TAS1C5D1 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**Test Instance-38:** TAS1C5D2 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**Test Instance-39:** TAS1C5D3 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**Test Instance-40:** TAS1C5D4 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**Test Instance-41:** TAS1C5D5 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**Test Instance-42:** TAS1C5D6 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**Test Instance-43:** TAS1C5D7 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**Test Instance-44:** TAS1C5D8 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**Test Instance-45:** TAS1C5D9 (Test Assembly Setup-Profile\_1 Capacity-Profile\_5 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - I

setuptime = [25,25,25,25,25,25,25,25,25,25,20,20,20,20,20,20,20,20,20,20,15,15,15,15,15,15,15,15,15,15,10,10,10,10,10,10,10,10,10,10];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [172.7273,345.4545,480.0000,413.3333,336.8421,347.3684];

**SETUP PROFILE – II**

**Test Instance-1:** TAS2C1D1 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-2:** TAS2C1D2 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-3:** TAS2C1D3 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-4:** TAS2C1D4 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-5:** TAS2C1D5 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-6:** TAS2C1D6 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-7:** TAS2C1D7 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-8:** TAS2C1D8 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-9:** TAS2C1D9 (Test Assembly Setup-Profile\_2 Capacity-Profile\_1 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - I (90%)

productstagecapacity = [68.4211,136.8421,294.7368,305.2632,378.9474,505.2632];

**Test Instance-10:** TAS2C2D1 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-11:** TAS2C2D2 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-12:** TAS2C2D3 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-13:** TAS2C2D4 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-14:** TAS2C2D5 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-15:** TAS2C2D6 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-16:** TAS2C2D7 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-17:** TAS2C2D8 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-18:** TAS2C2D9 (Test Assembly Setup-Profile\_2 Capacity-Profile\_2 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - II (70%)

productstagecapacity = [86.6667,173.3333,373.3333,386.6667,480.0000,640.0000];

**Test Instance-19:** TAS2C3D1 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-20:** TAS2C3D2 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-21:** TAS2C3D3 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-22:** TAS2C3D4 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-23:** TAS2C3D5 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-24:** TAS2C3D6 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-25:** TAS2C3D7 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-26:** TAS2C3D8 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-27:** TAS2C3D9 (Test Assembly Setup-Profile\_2 Capacity-Profile\_3 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - III (50%)

productstagecapacity = [118.1818,236.3636,509.0909,527.2727,654.5454,872.7272];

**Test Instance-28:** TAS2C4D1 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-29:** TAS2C4D2 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-30:** TAS2C4D3 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-31:** TAS2C4D4 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-32:** TAS2C4D5 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-33:** TAS2C4D6 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-34:** TAS2C4D7 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-35:** TAS2C4D8 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-36:** TAS2C4D9 (Test Assembly Setup-Profile\_2 Capacity-Profile\_4 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - IV (90%, 70%, 50%)

productstagecapacity = [68.4211,136.8421,373.3333,386.6667,654.5454,872.7272];

**Test Instance-37:** TAS2C5D1 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_1)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 1

primary\_demand = [[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0400,20.0004,20,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.0625,25.0006,25,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];

**Test Instance-38:** TAS2C5D2 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_2)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand - Series# 2

primary\_demand = [[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20],

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[21.0000,20.0100,20.0001,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[26.5625,25.0156,25.0002,25,25,25,25,25,25,25,25,25,25,25,25,25]]; // equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];

**Test Instance-39:** TAS2C5D3 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_3)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 3

primary\_demand = [[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[23.2400,20.0324,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[30.0625,25.0506,25.0005,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];

**Test Instance-40:** TAS2C5D4 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_4)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 4

primary\_demand = [[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.0900,20.0020,20.0000,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.1406,25.0032,25.0001,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];

**Test Instance-41:** TAS2C5D5 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_5)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 5

primary\_demand = [[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20],

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[22.2500,20.0506,20.0011,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[28.5156,25.0791,25.0018,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];

**Test Instance-42:** TAS2C5D6 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_6)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 6

primary\_demand = [[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20],

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[27.2900,20.1640,20.0037,20.0001,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[36.3906,25.2563,25.0058,25.0001,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];

**Test Instance-43:** TAS2C5D7 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_7)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 7

primary\_demand = [[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20],

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];

**Test Instance-44:** TAS2C5D8 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_8)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 8

primary\_demand = [[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20],

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[24.0000,20.1600,20.0064,20.0003,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[31.2500,25.2500,25.0100,25.0004,25,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];

**Test Instance-45:** TAS2C5D9 (Test Assembly Setup-Profile\_2 Capacity-Profile\_5 Demand-Series\_9)

FP = 2;

RP = 40;

J = 40;

L = 6;

T = 16;

S = 48;

allproductsonstage1 = {31,32,33,34,35,36,37,38,39,40};

allproductsonstage2\_1 = {15,16,17,18,19,20,21,22};

allproductsonstage2\_2 = {23,24,25,26,27,28,29,30};

allproductsonstage3 = {7,8,9,10,11,12,13,14};

allproductsonstage4 = {3,4,5,6};

allproductsonstage5 = {1,2};

family1stage1 = {31,32};

family2stage1 = {33,34};

family3stage1 = {35,36};

family4stage1 = {37,38};

family5stage1 = {39,40};

family1stage2\_1 = {20};

family2stage2\_1 = {22};

family3stage2\_1 = {15,16};

family4stage2\_1 = {17,18};

family5stage2\_1 = {19,20};

family6stage2\_1 = {21,22};

family1stage2\_2 = {23};

family2stage2\_2 = {27};

family3stage2\_2 = {29};

family4stage2\_2 = {23,24};

family5stage2\_2 = {25,26};

family6stage2\_2 = {27,28};

family7stage2\_2 = {29,30};

family1stage3 = {7};

family2stage3 = {8};

family3stage3 = {9};

family4stage3 = {10};

family5stage3 = {11};

family6stage3 = {12};

family7stage3 = {13};

family8stage3 = {14};

family9stage3 = {7,8};

family10stage3 = {9,10};

family11stage3 = {11,12};

family12stage3 = {13,14};

family1stage4 = {3};

family2stage4 = {4};

family3stage4 = {5};

family4stage4 = {6};

family5stage4 = {3,4};

family6stage4 = {5,6};

family1stage5 = {1};

family2stage5 = {2};

microperiods1tomacroperiod = {1,2,3};

microperiods2tomacroperiod = {4,5,6};

microperiods3tomacroperiod = {7,8,9};

microperiods4tomacroperiod = {10,11,12};

microperiods5tomacroperiod = {13,14,15};

microperiods6tomacroperiod = {16,17,18};

microperiods7tomacroperiod = {19,20,21};

microperiods8tomacroperiod = {22,23,24};

microperiods9tomacroperiod = {25,26,27};

microperiods10tomacroperiod = {28,29,30};

microperiods11tomacroperiod = {31,32,33};

microperiods12tomacroperiod = {34,35,36};

microperiods13tomacroperiod = {37,38,39};

microperiods14tomacroperiod = {40,41,42};

microperiods15tomacroperiod = {43,44,45};

microperiods16tomacroperiod = {46,47,48};

min\_lotsize = 1;

production\_cost = 1;

production\_time = 1;

standby\_cost = 1;

BOM = 1;

BigM = 10000;

holdingcost = [19,21,7,11,9,11,3,3,5,5,5,3,5,5,1,1,1,1,1,3,1,3,3,1,1,1,3,1,3,1,1,1,1,1,1,1,1,1,1,1];

//Product Demand – Series # 9

primary\_demand = [[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20],

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];

secondary\_demand = [

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[32.9600,20.5184,20.0207,20.0008,20,20,20,20,20,20,20,20,20,20,20,20], // equal to product-1

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25], // equal to product-2

[45.2500,25.8100,25.0324,25.0013,25.0001,25,25,25,25,25,25,25,25,25,25,25]];// equal to product-2

// Setup Profile - II

setuptime = [50,50,50,50,50,50,50,50,50,50,40,40,40,40,40,40,40,40,40,40,30,30,30,30,30,30,30,30,30,30,20,20,20,20,20,20,20,20,20,20];

setupcost = [10,12.5,10,10,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,10,10,10,10,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5,12.5,12.5,10,10,10,10,12.5,12.5,12.5,12.5,12.5,12.5];

// Capacity Utilization Profile - V (50%, 70%, 90%)

productstagecapacity = [118.1818,236.3636,373.3333,386.6667,378.9474,505.2632];