```
In [5]:   #Evaluating model
          summary(E02000_model)
          summary(E26270_model)
          summary(P23250_model)
          summary(P22250_model)
```

```
Call:
multinom(formula = E02000_dum ~ DSI + EIC + MARS1 + MARS2 + MARS3 +
    MARS4 + E00200 + E00300 + E00600 + E00800 + E00900 + E01100 +
    E01400 + E01500 + E01700 + E02100 + E02300 + E02400 + E03150 +
    E03210 + E03240 + E03270 + E03300 + E17500 + E18400 + E18500 +
    E19200 + E19800 + E20100 + E20400 + E32800, data = training,
    maxit = 500)

Coefficients:
    (Intercept)       DSI        EIC       MARS1        MARS2        MARS3       M
ARS4
0    1.9874198 3.009857   0.4756921 0.8429926  -0.04628563   0.02749638 1.163
2163
1    0.2983018 1.224714  -0.3947172 0.1289787   0.20512138  -0.21918655 0.183
3883
          E00200          E00300          E00600          E00800          E00900
0   2.076696e-07 -1.778496e-05 -1.722540e-07 -4.880659e-06   3.787335e-07
1  -1.179350e-07 -5.464450e-07 -1.127392e-07 -4.283574e-06  -2.940888e-07
        E01100          E01400          E01500          E01700          E02100
0 5.905164e-05 -6.031489e-07 8.112152e-09 -4.145658e-07   1.651183e-06
1 5.714936e-05 -1.638518e-07 1.261651e-09 -7.081966e-07  -5.252980e-07
          E02300          E02400          E03150          E03210          E03240
0   1.068405e-05 -1.423735e-05 -4.602939e-05   0.0001469190 -5.256210e-05
1  -5.150289e-05   2.481357e-06   5.454652e-05 -0.0006081443   1.845693e-05
          E03270          E03300          E17500          E18400          E18500
0 -9.690712e-05 -1.285791e-07 -4.071283e-06 -2.717203e-06 -3.169998e-05
1   5.607542e-05   8.348084e-06   1.087430e-06   7.189324e-07   2.613204e-06
          E19200          E19800          E20100          E20400          E32800
0 -1.550225e-05 -2.644716e-06 3.625892e-08 -5.152127e-06 1.095146e-04
1   4.789423e-07   3.363668e-07 1.931723e-08 -1.617103e-06 6.666914e-05

Std. Errors:
    (Intercept)           DSI            EIC           MARS1           MARS2
MARS3
0 1.454945e-08 3.947868e-12 6.642139e-10 4.303982e-09 9.996911e-09 1.4868
59e-10
1 7.965160e-09 1.036110e-12 2.237059e-10 2.034029e-09 5.946586e-09 5.7892
02e-11
          MARS4          E00200          E00300          E00600          E00800
E00900
0 4.911430e-10 1.644290e-08 4.975791e-07 6.525822e-08 6.668207e-06 5.4116
97e-08
1 2.522339e-10 1.049107e-08 5.382326e-08 2.560331e-08 8.547922e-06 4.1867
81e-08
        E01100          E01400          E01500          E01700          E02100
E02300
0 2.771822e-05 1.136414e-07 2.737752e-08 1.895078e-07 2.177452e-07 3.7744
92e-06
1 2.791172e-05 6.658567e-08 2.866086e-08 1.697970e-07 1.508633e-07 5.3686
29e-06
          E02400          E03150          E03210          E03240          E03270
```

```
E03300
0 8.073719e-07 8.013736e-06 2.794262e-05 3.136828e-06 3.139578e-06 1.0126
59e-06
1 7.576445e-07 7.022374e-06 1.261049e-05 1.093136e-06 2.095749e-06 8.1020
24e-07
          E17500        E18400        E18500        E19200        E19800
E20100
0 1.081399e-06 1.727108e-07 1.086982e-06 5.885470e-07 2.906207e-07 1.0600
07e-07
1 7.999955e-07 7.076740e-08 4.923190e-07 1.537218e-07 6.173154e-08 4.2741
60e-08
          E20400        E32800
0 5.126957e-07 1.532740e-05
1 1.546858e-07 1.638344e-05

Residual Deviance: 170298.9
AIC: 170422.9

Call:
multinom(formula = E26270_dum ~ DSI + EIC + MARS1 + MARS2 + MARS3 +
    MARS4 + E00200 + E00300 + E00600 + E00800 + E00900 + E01100 +
    E01400 + E01500 + E01700 + E02100 + E02300 + E02400 + E03150 +
    E03210 + E03240 + E03270 + E03300 + E17500 + E18400 + E18500 +
    E19200 + E19800 + E20100 + E20400 + E32800, data = training,
    maxit = 500)

Coefficients:
   (Intercept)         DSI          EIC        MARS1        MARS2        MARS3
0    2.3309254 2.1589744   0.71613478 1.00150482  -0.005847538   0.01367413
1    0.2781408 0.2163839  -0.08442374 0.09565474   0.163661827  -0.22891085
        MARS4        E00200        E00300        E00600        E00800
0 1.3215939   2.009163e-07 -1.543592e-05 -2.118303e-07 -7.744084e-06
1 0.2477351  -1.250408e-07 -5.208204e-07 -1.520829e-07 -1.522509e-04
          E00900        E01100        E01400        E01500        E01700
0   4.219073e-07 3.182015e-05 -7.123116e-07 -3.589327e-08   6.567469e-08
1  -3.902314e-07 3.699071e-05 -1.547311e-07 -3.625296e-08  -1.039271e-06
          E02100        E02300        E02400        E03150        E03210
0   1.508084e-06   3.540182e-05 -7.736836e-06 -2.465049e-05   0.0004185183
1  -5.963464e-07  -3.577294e-05 -4.088825e-06   4.843066e-05  -0.0004476445
          E03240        E03270        E03300        E17500        E18400
0 -3.454320e-05 -8.782414e-05 -1.294957e-06   7.947095e-07 -3.139234e-06
1   1.623674e-05   5.737706e-05   8.341808e-06  -6.948734e-07   6.920313e-07
          E18500        E19200        E19800        E20100        E20400
0 -3.929215e-05 -1.621748e-05 -2.408259e-06 -9.923310e-08 -3.446631e-06
1   2.085749e-06   4.633574e-07   2.715335e-07 -8.690465e-09 -1.515293e-06
        E32800
0 0.0001410871
1 0.0001224177

Std. Errors:
   (Intercept)          DSI          EIC        MARS1        MARS2
MARS3
0 2.056314e-08 3.381370e-12 6.898104e-10 5.115332e-09 1.512024e-08 1.1134
72e-10
1 1.236534e-08 4.559834e-13 3.845952e-10 2.817731e-09 9.420262e-09 5.1841
40e-11
          MARS4        E00200        E00300        E00600        E00800
```

```
E00900
0 5.418089e-10 1.641920e-08 4.050564e-07 6.144533e-08 6.334633e-06 5.4807
33e-08
1 3.282810e-10 1.075825e-08 5.386089e-08 2.799273e-08 5.127039e-08 4.5610
94e-08
          E01100        E01400        E01500        E01700        E02100
E02300
0 2.260894e-05 1.065458e-07 2.445309e-08 2.015026e-07 2.099218e-07 5.2153
51e-06
1 2.279551e-05 6.775168e-08 2.907889e-08 2.049754e-07 1.541324e-07 7.1176
45e-06
          E02400        E03150        E03210        E03240        E03270
E03300
0 8.370484e-07 7.925884e-06 3.637107e-05 2.080301e-06 2.874845e-06 9.8060
37e-07
1 8.427225e-07 7.479312e-06 1.978930e-05 9.541358e-07 2.106151e-06 8.0438
33e-07
          E17500        E18400        E18500        E19200        E19800
E20100
0 9.570718e-07 1.685099e-07 1.051821e-06 5.683457e-07 2.542144e-07 1.1742
36e-07
1 9.225935e-07 6.881301e-08 4.843910e-07 1.526244e-07 5.560206e-08 4.5373
78e-08
          E20400        E32800
0 4.345891e-07 1.799715e-05
1 1.580516e-07 1.905509e-05


Residual Deviance: 142889.7
AIC: 143013.7

Call:
multinom(formula = P23250_dum ~ DSI + EIC + MARS1 + MARS2 + MARS3 +
    MARS4 + E00200 + E00300 + E00600 + E00800 + E00900 + E01100 +
    E01400 + E01500 + E01700 + E02100 + E02300 + E02400 + E03150 +
    E03210 + E03240 + E03270 + E03300 + E17500 + E18400 + E18500 +
    E19200 + E19800 + E20100 + E20400 + E32800, data = training,
    maxit = 500)

Coefficients:
   (Intercept)        DSI        EIC        MARS1        MARS2        MARS3        MA
RS4
0   2.5594647  0.5922068  0.9495542 0.7684282 0.07382472 0.4612663 1.2559
451
1   0.8760666 -0.1480461 -0.2680553 0.2051168 0.27584504 0.2166684 0.1784
367
          E00200        E00300        E00600        E00800        E00900
0 -5.899278e-07 -9.505470e-06 -3.580981e-06 -2.496481e-05  1.466583e-07
1 -9.235992e-09 -1.389299e-08  1.333492e-07 -1.392633e-05 -2.166147e-08
       E01100        E01400        E01500        E01700        E02100
0 11.855856 -1.949015e-06 -4.721372e-07 -3.801355e-07  1.451592e-07
1  4.162025  5.748373e-08  5.122857e-09  1.001519e-08 -7.045273e-07
          E02300        E02400        E03150        E03210        E03240
0  1.762067e-05 -2.575426e-05 -6.422214e-05  0.0006217145 -2.322000e-06
1 -3.645879e-05 -3.215207e-07 -1.011748e-06 -0.0001709410  5.720402e-08
          E03270        E03300        E17500        E18400        E18500
0 -3.720103e-05 -1.560107e-05 -1.252643e-05 -2.171818e-06 -5.401535e-05
1  7.037419e-06  2.861487e-07 -3.424983e-07  2.711472e-07  2.187157e-06
```

```
             E19200          E19800          E20100          E20400          E32800
0  5.602217e-07  -3.192278e-06  -1.616371e-06  -4.426539e-05  9.096442e-05
1  1.172927e-07   1.154475e-07   2.715538e-07   2.617656e-06  3.979881e-06


Std. Errors:
     (Intercept)          DSI             EIC           MARS1           MARS2
MARS3
0  1.629617e-08  4.672966e-12  2.952096e-10  5.007345e-09  1.110660e-08  6.4007
47e-11
1  1.394339e-08  3.463497e-12  2.008364e-10  4.111722e-09  9.715659e-09  4.8499
03e-11
           MARS4          E00200          E00300          E00600          E00800          E
00900
0  4.26707e-10  2.685736e-08  3.966849e-07  2.334635e-07  6.864219e-06  4.54651
6e-08
1  3.17818e-10  1.093101e-08  5.571235e-08  4.641159e-08  6.808603e-06  3.45494
3e-08
           E01100          E01400          E01500          E01700          E02100
E02300
0  1.980789e-15  2.173920e-07  3.794815e-08  2.763504e-07  2.093626e-07  4.8282
93e-06
1  1.977736e-15  8.216236e-08  2.392410e-08  1.761591e-07  1.992125e-07  5.6342
96e-06
           E02400          E03150          E03210          E03240          E03270
E03300
0  9.244999e-07  7.779922e-06  2.759198e-05  5.330362e-07  2.511548e-06  9.8346
31e-07
1  8.156698e-07  7.073290e-06  2.255002e-05  2.385883e-07  1.985954e-06  5.5811
52e-07
           E17500          E18400          E18500          E19200          E19800
E20100
0  1.381867e-06  2.184011e-07  1.381786e-06  4.687242e-07  3.874757e-07  6.3896
95e-07
1  8.341124e-07  7.886717e-08  6.303893e-07  2.174030e-07  8.717931e-08  1.3307
54e-07
           E20400          E32800
0  1.488959e-06  1.757247e-05
1  3.114204e-07  1.798701e-05


Residual Deviance: 155625.1
AIC: 155749.1

Call:
multinom(formula = P22250_dum ~ DSI + EIC + MARS1 + MARS2 + MARS3 +
    MARS4 + E00200 + E00300 + E00600 + E00800 + E00900 + E01100 +
    E01400 + E01500 + E01700 + E02100 + E02300 + E02400 + E03150 +
    E03210 + E03240 + E03270 + E03300 + E17500 + E18400 + E18500 +
    E19200 + E19800 + E20100 + E20400 + E32800, data = training,
    maxit = 500)


Coefficients:
    (Intercept)          DSI             EIC           MARS1           MARS2           MARS3
0    2.166256  1.0869863   1.34068499   0.7294433  -0.06081535   0.39498534
1   -0.100838  0.2510634  -0.06767067  -0.0267272  -0.02819216  -0.03615306
           MARS4          E00200          E00300          E00600          E00800
0  1.102643528  -8.274275e-07  -2.772727e-06  -1.492856e-06  -2.271639e-05
1 -0.009765488  -1.040123e-08   1.144523e-07  -1.922794e-08  -1.376099e-05
           E00900          E01100          E01400          E01500          E01700
```

```
0 −1.003505e−08    5.829342 −1.627521e−06 −3.740756e−07 −3.189665e−07
1 −4.120479e−08 −14.916664 −2.257489e−08 −2.279635e−10 −1.811993e−07
             E02100         E02300         E02400         E03150         E03210
0  1.614217e−07  3.081240e−05 −1.606383e−05 −4.981170e−05  7.542565e−04
1 −7.304492e−08 −5.233281e−06 −5.811546e−06  7.811432e−07 −7.866069e−05
             E03240         E03270         E03300         E17500         E18400
0 −7.318322e−08 −2.446397e−05 −1.318800e−05 −6.877196e−06 −9.154276e−07
1 −3.379732e−07  4.193689e−06 −3.730394e−07 −6.856668e−07 −3.415700e−08
             E18500         E19200         E19800         E20100         E20400
0 −3.615803e−05 8.413149e−08 8.094791e−08 −5.738434e−08 −4.928997e−05
1 −7.028300e−07 5.235323e−07 6.783978e−09  3.274658e−08 −1.607097e−07
          E32800
0 7.484051e−05
1 6.495743e−06


Std. Errors:
    (Intercept)            DSI            EIC          MARS1          MARS2
MARS3
0 2.634319e−08 5.161228e−12 3.110366e−10 7.821892e−09 1.802301e−08 6.8779
74e−11
1 1.528681e−08 3.011912e−12 1.685270e−10 4.402756e−09 1.065549e−08 3.9610
84e−11
          MARS4         E00200         E00300         E00600         E00800
E00900
0 6.199489e−10 2.184354e−08 1.706806e−07 1.075822e−07 6.293459e−06 3.6168
14e−08
1 3.917174e−10 7.218550e−09 3.255410e−08 1.695792e−08 9.714740e−06 3.2546
84e−08
          E01100         E01400         E01500         E01700         E02100
E02300
0 2.655636e−15 1.479659e−07 2.997242e−08 2.004916e−07 1.283658e−07 4.4658
15e−06
1 1.860956e−20 6.227583e−08 2.082888e−08 1.547640e−07 1.118039e−07 6.1338
25e−06
          E02400         E03150         E03210         E03240         E03270
E03300
0 7.383580e−07 6.144367e−06 4.151976e−05 3.046139e−07 1.888124e−06 7.1863
26e−07
1 7.824113e−07 6.764483e−06 2.286536e−05 1.593000e−07 1.712583e−06 4.6644
48e−07
          E17500         E18400         E18500         E19200         E19800
E20100
0 1.060940e−06 1.332947e−07 9.754872e−07 3.368325e−07 1.082200e−07 1.2320
82e−07
1 7.595417e−07 3.420431e−08 4.165589e−07 1.381187e−07 3.468935e−08 3.3705
31e−08
          E20400         E32800
0 1.150848e−06 1.372271e−05
1 9.590568e−08 1.658705e−05


Residual Deviance: 150601.5
AIC: 150725.5
```