7.7

$$P(I_1=X_1,I_2=X_2,I_3=X_3|O_1=o_1,O_2=o_2,O_3=o_3,\lambda)=\frac{P(I_1=X_1,I_2=X_2,I_3=X_3,O_1=o_1,O_2=o_2,O_3=o_3,|\lambda)}{P(O_1=o_1,O_2=o_2,O_3=o_3|\lambda)}$$
$$=\frac{P(I_1=X_1,I_2=X_2,I_3=X_3,O_1=o_1,O_2=o_2,O_3=o_3,|\lambda)}{\sum\limits_{I_i\in I}P(O_1=o_1,O_2=o_2,O_3=o_3,I=I_i|\lambda)}$$
$$=\frac{4500}{30000}=15\%$$

7.8

D

7.9

B

7.10

C

7.11

(1)计算初值

$$\beta_4(i)=1\quad i=1,2,3$$

(2)递推计算

$$\beta_3(1)=\sum_{j=1}^{3}a_{1j}b_j(O_4)\beta_4(j)=0.46$$
$$\beta_3(2)=\sum_{j=1}^{3}a_{2j}b_j(O_4)\beta_4(j)=0.51$$
$$\beta_3(3)=\sum_{j=1}^{3}a_{3j}b_j(O_4)\beta_4(j)=0.43$$
$$\beta_2(1)=\sum_{j=1}^{3}a_{1j}b_j(O_3)\beta_3(j)=0.2461$$
$$\beta_2(2)=\sum_{j=1}^{3}a_{2j}b_j(O_3)\beta_3(j)=0.2312$$
$$\beta_2(3)=\sum_{j=1}^{3}a_{3j}b_j(O_3)\beta_3(j)=0.2577$$
$$\beta_1(1)=\sum_{j=1}^{3}a_{1j}b_j(O_2)\beta_2(j)=0.1124$$
$$\beta_1(2)=\sum_{j=1}^{3}a_{2j}b_j(O_2)\beta_2(j)=0.1217$$
$$\beta_1(3)=\sum_{j=1}^{3}a_{3j}b_j(O_2)\beta_2(j)=0.1048$$

(3)终止

$$P(O|\lambda) = \sum_{i=1}^{3} \pi_i b_i(O_1) \beta_1(i) = 0.060$$