MSBA 7004 Practice Final Answers

Question 1.

(a) $TH=\lambda/(1-r)=30/(1-0.25)=40$ cars/day   [4 points]

(b) $Im=Rm*T=40*12=480$, $Ii=40*1=40$, $Iw=30*0.6*3=54$, $It=480+40+54=574$ cars   [4 points]

(c) $T=It/R=574/30=19.13$ days   [4 points]

Question 2.

(a) A-B A: $60/(5+2*(5+3))=2.86$/hr, B: 5.71/hr

    A-C A: $60/(10+3*(10+2))=1.30$/hr C: 3.91/hr   [2 points each]

(b) A-B: $2.86*2+5.71*1=\$11.43$/hr A-C: $1.30*2+3.91*0.5=\$4.56$/hr, Produce B   [2 points each]

Question 3.

(a) Rho$=6/10=0.6$, $I\_q=rho^2/(1-rho)=0.9$, $I\_s=rho=0.6$

    $I=I\_q+I\_s=0.9+0.6=1.5$ [2 points]

(b) $T\_q=I\_q/lamda=0.9/6=0.15$ hr $=9$ min   [2 points]

(c) $T\_q=I\_q/lamda= I\_q/6< 4$min $= 4/60$hr $I\_q<0.4$ rho<0.463325 mu>12.94987 service time <4.63325 mins   [6 points]

Question 4.

(a) 58, C-F-G   [2 points each]

(b) Crash C by 5 weeks   [6 points]

Question 5.

(a) Critical ratio$=15/(7+15)=0.68>=6/9$. Hence 7 trees   [5 points]

(b) $1*(1/9)+2*(1/9)+3*(1/9)+4*6*(1/9)=3.33$ [5 points]

Question 6.

(a) $Z=(14-30)/10=-1.6$ -> SL$=5.48\%$ [5 points]

(b) $C\_o=2*C\_u$, CR$=C\_u/(C\_o+C\_u)=1/3$ -> $Z=-0.43$, overbooking$=30+(-0.43)*10=25.7$

    Number of students to admit$=216+25.7=241.7$ [5 points]

Question 7.

(a) AVG CS$=T*D/2=5000*14/365/2=95.89$, PI$=LT*D=3/365*5000=41.10$,

    SS$=Z*sigma\_(T+LT)=2*10*sqrt(14+3)=82.46$

    Total AVG Inv $= 95.89+41.10+82.46=219.45$

    Total Holding Cost$=\$11*25\%*219.45=\$603.5$/year

                                [6 points; 4 points for inventory, 2 points for holding cost]

(b) Number of orders per year: $365/14=26.07$ orders/yr

    Total Ordering Cost$=\$50*26.07=\$1303.6$/year   [4 points]

(c) Target level$=D*EP+SS=5000*(14+3)/365+82.46$, Order amount$=$Target level$-60=255.34$ [4 points]

(d) Decision variable: Review Period (T)   [6 points; 2 points, 4 points]

    Objective function:

    $365/T*\$50+[(5000/365)*T/2+2*10*sqrt(T+3)+3*(5000/365)]*\$11*25\%$

(e) AVG CS$=T*D/2=5000*28/365/2=191.78$, PI$=LT*D=3/365*5000=41.10$

    SS$=Z*sigma\_(T+LT)=2*10*sqrt(28+3)= 111.36$

Total AVG Inv = 191.78+41.10+111.36=344.24

Total Holding Cost=$11*25%*344.24=$946.7/year

Number of orders per year: 365/28=13.04 orders/yr

Total Ordering Cost=$50*13.04=$652/year

Total Cost = $652 + $946.7 = $1598.7/year

Cost Saving = Original Total Cost - $1598.7 = $603.5 + $1303.6 - $1598.7 = $308.4/year

[6 points]

(f) EOQ = sqrt(2SD/H) = sqrt(2*50*5000/(11*25%)) = 426.4

[6 points]

Note:

This solution only provides you with final answers. In the exam, please write down the detailed steps.