POM
2nd Semester 2023/2024

FORMULA SHEET

Stock Management

EOQ

$Q = \sqrt{\frac{2DS}{H}}$; N = D/Q ; ROP = d × L

$$TC = \frac{Q}{2} \times H + \frac{D}{Q} \times S + P \times D$$

POQ

$Q = \sqrt{\frac{2DS}{H(1-\frac{d}{p})}}$

$$TC = \frac{Q}{2}\,(1 - \frac{d}{p}) \times H + \frac{D}{Q} \times S + P \times D$$

$t_p = t_1 = \frac{Q}{p}$ $\quad$ $T = \frac{Q}{D}$ $\quad$ N = D/Q $\quad$ $I_{máx} = M = Q(1 - \frac{d}{p})$

Probabilistic Models

$$SS = Z_\alpha \sigma_{dLT}$$

$$ROP = \mu_{LT} \times \mu_d + SS$$

$$ROP = LT \times \mu_d + SS$$

$$ROP = \mu_{LT} \times d + SS$$

$$\sigma_{dLT} = \sqrt{\mu_d^2 \times \sigma_{LT}^2 + \mu_{LT} \times \sigma_d^2}$$

$$\sigma_{dLT} = \sqrt{LT} \times \sigma_d$$

$$\sigma_{dLT} = \sqrt{d^2 \times \sigma_{LT}^2}$$

$\alpha = P(X > ROP) =$probability of rupture

$$TC = \left(\frac{Q}{2} + SS\right) \times H + \frac{D}{Q} \times S + P \times D$$

Project Management

EF = ES + activity duration

LS = LF – activity duration

Slack = LS – ES = LF– EF

Crash cost per period $= \frac{CC - NC}{NT - CT}$

Expected Duration $= t = \frac{a + 4m + b}{6}$

Variance $= \left[\frac{(b-a)}{6}\right]^2$

Waiting Line Models

$$L_q = \lambda \times W_q \;;\; L_S = \lambda \times W_S ;\;\; L_S = L_q + \lambda / \mu ;\;\; W_S = W_q + 1/\mu$$

M/M/1

$$L_q = \frac{\lambda^2}{\mu(\mu - \lambda)} ;\; L_S = \frac{\lambda}{\mu - \lambda}$$

$$W_q = \frac{\lambda}{\mu(\mu - \lambda)} ;$$

$$\rho = \frac{\lambda}{\mu} ; \quad P_0 = 1 - \rho \quad P_n = P_0 \times \left(\frac{\lambda}{\mu}\right)^n$$

$$W_S = \frac{1}{\mu - \lambda}$$

$$P(n > k) = \rho^{k+1}$$

M/M/S

$$P_0 = \frac{1}{\left[\sum_{n=0}^{S-1} \frac{1}{n!}\left(\frac{\lambda}{\mu}\right)^n\right] + \frac{(\lambda/\mu)^S}{S!} \times \frac{S\mu}{S\mu - \lambda}} (S\mu > \lambda) \quad Lq = \frac{\lambda \times \mu \times \left(\frac{\lambda}{\mu}\right)^S}{(S-1)!(S\mu - \lambda)^2} P_0$$

$$\rho = \frac{\lambda}{S\mu}$$

$$P_n = \frac{\left(\frac{\lambda}{\mu}\right)^n}{n!} P_0 \;\; (n \le S) \qquad P_n = \frac{\left(\frac{\lambda}{\mu}\right)^n}{S!\, S^{n-S}} P_0 \;\; (n > S)$$

M/D/1

$$L_q = \frac{\lambda^2}{2\mu(\mu - \lambda)} ; \qquad W_q = \frac{\lambda}{2\mu(\mu - \lambda)} ; \qquad \rho = \frac{\lambda}{\mu}$$

Scheduling

CR = $\frac{\text{Promise Date} - \text{Actual date}}{\text{Number of days of work}}$

Usage = $\frac{\text{Total work time}}{\text{Sum of flow time}}$

Average conclusion time = $\frac{\text{Sum of Flow Time}}{\text{Number of jobs}}$

Average delay = $\frac{\text{Total time delay}}{\text{Number of jobs}}$

Average number of jobs in the system= $\frac{\text{Sum of flow time}}{\text{Total time of work}}$

Process Statistical Control

$LSC_{\bar{X}} = \bar{\bar{X}} + A_2 \times \bar{R}$ $LIC_{\bar{X}} = \bar{\bar{X}} - A_2 \times \bar{R}$ $LC_{\bar{X}} = \bar{\bar{X}}$ $LSC_R = D_4 \times \bar{R}$ $LIC_R = D_3 \times \bar{R}$ $LC_R = \bar{R}$	$LSC_c = \bar{c} + 3 \times \sqrt{\bar{c}}$ $LIC_c = \bar{c} - 3 \times \sqrt{\bar{c}}$ $LC_c = \bar{c}$

$C_{pk} = \min(C_{pki}; C_{pks})$ $C_p = \frac{LSE - LIE}{6 \times \sigma}$ $C_{pki} = \frac{\mu - LIE}{3 \times \sigma}$ e $C_{pks} = \frac{LSE - \mu}{3 \times \sigma}$	$LSC_p = \bar{p} + 3 \times \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$ $LIC_p = \bar{p} - 3 \times \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$ $LC_p = \bar{p}$

Capacity and Constraints Management

$$\text{Capacity us}age = \frac{\text{Actual Output}}{\text{C}apacity\text{ design}}$$

$$\text{Eficiency} = \frac{\text{Actual output}}{\text{Effective output}}$$

$$\text{Capacity} = \frac{1}{\text{Cycle time}}$$