Ch - 7

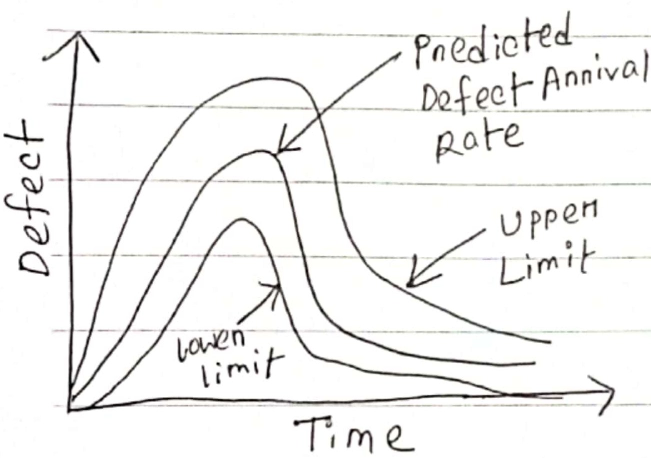
MTBF - mean-time between failure

MTBF → ∞ ; SW availability → 100%

MTBF → 0 ; " " → 0%

never fails
- code contains faults but that part is never executed

fails every time
→ may have only 1 fault



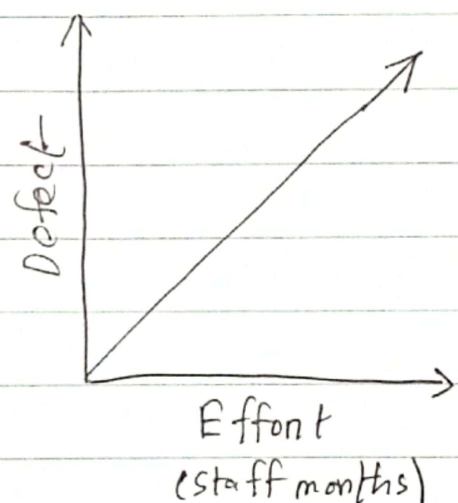


Fig: Defect arrival rates

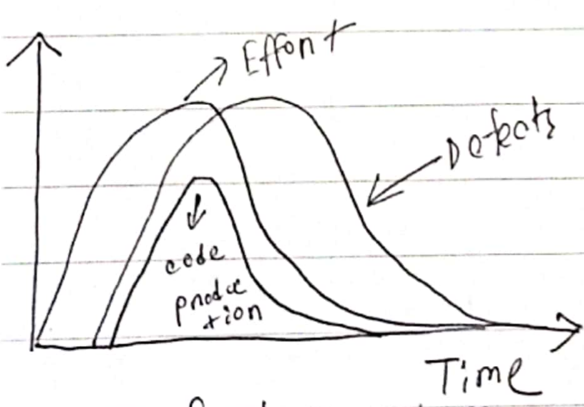


Fig: Defect vs staffing

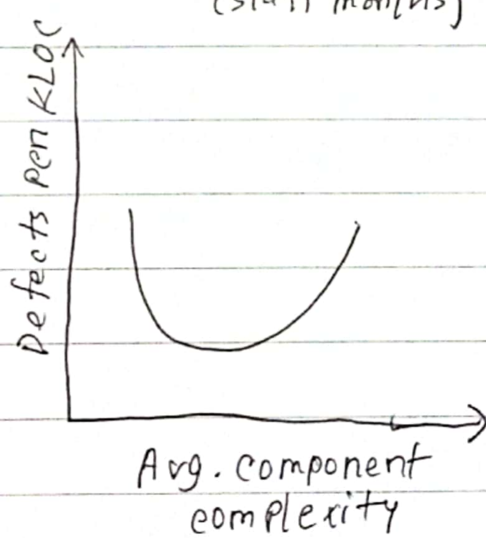
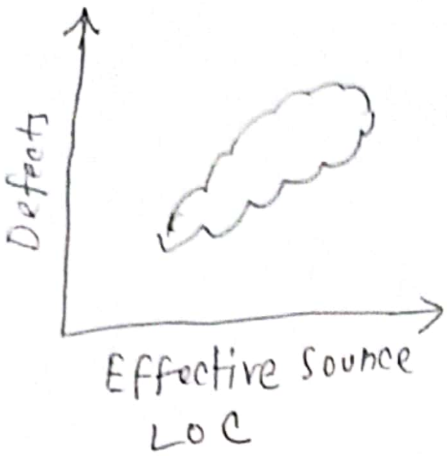
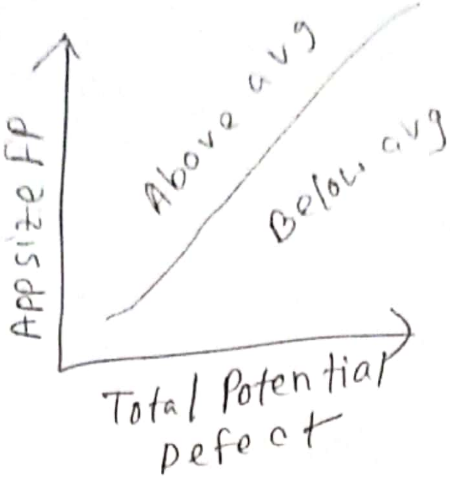


Fig: Bathtub chart





→ Defect Density vs system size

→ Defect vs FP

* 2 distributed function:

→ 1) PDF (Probability distribut~~ed~~ion ~~syst~~ function)

$\downarrow$ $f(t)$

→ defect arrival

2) CDF (Cumulative distribution function)

$$F(t) = \frac{\text{total no. of defects to arrive}}{\text{time}}$$

$$= \frac{f(t)}{t} = \frac{d}{dt} f(t)$$

$$f(t) = m(t/c)^m e^{(-t/c)^m} / t$$

$$F(t) = 1 - e^{-(t/c)^m}$$

Exponential : $m = 1$ | Rayleigh : $m = 2$

Here, $c = \sqrt{2}\, t_m$

$t_m \to t$ at which $f(t) = max$

$$f(t) = K\left[(1/t_m)^2\, t\, e^{-(1/2t_m^2)t^2}\right]$$

$$F(t) = K\left[1 - e^{-(1/2t_m^2)t^2}\right]$$

40%

Ex:

week	1	2	3	4	5	6	7	8	9
Defects	20	41	48	52	$\boxed{62}$	59	52	44	33

$t_m = 5$, total no. of defects,

$$K = \frac{20+41+48+52+62}{0.4} \simeq 557$$

$$\therefore f(t) = 557\left[(1/5)^2 . t\, e^{-(1/50)t^2}\right]$$

$$= 557\left[(t/25)\, e^{-(t^2/50)}\right]$$

$$F(t) = 557\left[1 - e^{-(t^2/50)}\right]$$

Method 2: $f(1) = 20$, $t = 1$, $t_m = 5)$

$$20 = K\left[(1/25)\, e^{-(1/50)}\right]$$

$$\to 20 \times 25 = K e^{-(1/50)}$$

$$\rightarrow \quad 500 = \frac{k}{e^{1/50}}$$

$$\therefore \quad k = 510$$

$$\therefore \quad f(t) = 510\left[(t/25)\, e^{-(t^2/50)}\right]$$

$$= 20.4\, t\, e^{-(t^2/50)}$$

$$F(t) = 510\left[1 - e^{-(t^2/50)}\right]$$

18 Q

$\boxed{b)}$ You're now in system test for technovent website. Assume a releigh curve.

Month	1	2	3	4	5	6
Defect	13	22	25	22	17	5

i) $f(t) = K * \left[2(t/c^2)\, e^{-(t/c)^2}\right]$; $c = \sqrt{2}\, t_m$

$$= K * \left[2(t/2t_m^2)\, e^{-(t^2/2t_m^2)}\right]$$

Here, $t_m = 3$, $K = \frac{13+22+25}{0.33} = 181.82$

$$\therefore f(t) = 181\left[2(t/18)\, e^{-(t^2/18)}\right]$$

$$= \frac{181}{9}\, t\, e^{-(t^2/18)}$$

$$F(t) = 181\left[1 - e^{-(t^2/18)}\right]$$

(11) End of month 3:

$$\text{Defect removal efficiency} = \frac{\text{no. of defects resolved}}{\text{total no. of defects}}$$

$$= \frac{13+22+25}{13+22+25+22+17+5} = 57.7\%$$

DRE → Defect Removal Efficiency

$$DRE = \frac{E}{E+D}$$

E → no. of defects found $\boxed{\text{before}}$ delivery

D → " " " " $\boxed{\text{after}}$ "