

51/

Lecture 9ex1: ACFR system with $\lambda = 0.0004$

has operating:

- ① Compute the reliability of 200 hr
- ② design life if $R(t) \geq 0.90$
- ③ median time to failure.

sol:

التوزيع الأسي والاحتمالية

$$R(t) = e^{-\lambda t}$$

$$R(t) = e^{-0.0004t}$$

$$R(200) = e^{-0.0004(200)}$$

$$R(200) = e^{-0.08} = 0.9231$$

$$R(t) = e^{-0.0004t}$$

$$0.90 = e^{-0.0004t}$$

$$\ln 0.90 = -0.0004t$$

$$\frac{-\ln 0.90}{0.0004} = t$$

$$\frac{0.10536}{0.0004} = t \Rightarrow t = 263.401$$

52

③ median time to failure

$$R(t) = e^{-0.0004t}$$

$$0.5 = e^{-0.0004t}$$

$$\frac{-\ln 0.5}{0.0004} = t$$

$$\Rightarrow t_{\text{med}} = \frac{0.6931}{0.0004} = 1732.86$$

ex! A hydraulic system is comprised of five components having $\lambda_1 = 0.001$, $\lambda_2 = 0.005$, $\lambda_3 = 0.0007$, $\lambda_4 = 0.0025$ and $\lambda_5 = 0.00001$

a) Find the system MTTF and standard deviation

b) Find the design life if $R(t) \leq 0.99$

sol

$$MTTF = \frac{1}{\sum_{i=1}^5 \lambda_i} = \frac{1}{0.005 + 0.0007 + 0.001}$$

MTTF

$$= \frac{1}{0.0025 + 0.00001} = \frac{1}{0.00251}$$

53/

$$MTTF = \frac{1}{0.00921}$$

$$MTTF = 108.5776$$

$$C) R(t) = e^{-\sum_{i=1}^5 \lambda_i t}$$

$$0.99 = e^{-0.00921 t}$$

$$\frac{-\ln 0.99}{0.00921} = t$$

$$\Rightarrow t = 1.091$$