

Unit 11 - Week 9

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Assignment 9

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-01, 23:59 IST.

- 1) An optical sensor has a Weibull time-to-failure distribution with a scale parameter of 300 h and a shape parameter of 0.5. What is the reliability of the sensor after 500 h of operation? Find the mean time to failure 2 points
- a. 0.725, 400
b. 0.275, 600
c. 0.725, 500
d. 0.275, 700
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
b.
- 2) Four components A, B, C, and D are placed in parallel to make a subassembly in a circuit board. The reliabilities of A, B, C, and D are 0.93, 0.88, 0.95, and 0.92, respectively. Find the reliability of the subassembly. 2 points
- a. 0.9966994
b. 0.9999446
c. 0.9999664
d. 0.9944669
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
c.
- 3) A transistor has an exponential time-to-failure distribution with a constant failure rate of 0.0006/h. Find the reliability of the transistor after 4000 h of operation. What is the mean time-to-failure? 2 points
- a. 0.6678, 14444.445 hours
b. 0.6678, 15555.556 hours
c. 0.7866, 16666.667 hours
d. 0.7866, 17777.778 hours
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
c.
- 4) The time-to-failure density function (pdf) for a system is given by 2 points
- $$f(t) = \frac{2}{a^2} \quad 0 \leq t \leq a$$
- Determine $F(t)$, $R(t)$, $\lambda(t)$, and MTTF
- a. $2t/a^2, (a^2 - 2t)/a^2, 2/(a^2 - 2t), a - 1$
b. $2/a^2, (a^2 - 2t)/a^2, 2/(a^2 - 2t), a - 1$
c. $2/a^2, (a^2 - t)/a^2, 2/(a^2 - 2t), a - 1$
d. $2t/a^2, (a^2 - t)/a^2, 2/(a^2 - t), a - 1$
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
a.
- 5) Consider the seven-component system shown in figure below. Assume that the time to failure for each component has an exponential distribution. The failure rates are as follows: $\lambda_A=0.0005/h$, $\lambda_B=0.0005/h$, $\lambda_C=0.0003/h$, $\lambda_D=0.0008/h$, $\lambda_E=0.0004/h$, $\lambda_F=0.006/h$ and $\lambda_G=0.0064/h$. Find the reliability of the system after 1000h. What is the mean time to failure of the system? 2 points
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- a. 0.003346, 175.43 hours
b. 0.004436, 157.34 hours
c. 0.004436, 175.43 hours
d. 0.003346, 157.34 hours
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
a.
- 6) The time to failure in hours of a system has the density function given as 2 points
- $$f(t) = 0.002 \exp[-0.002t]$$
- Find the probability that the system will fail in
- a) Less than 100 hours
b) Less than 1,000 hours
- a. 0.18172, 0.8647
b. 0.18172, 0.8764
c. 0.18127, 0.8764
d. 0.18127, 0.8647
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
d.
- 7) The failure rate of a certain electronic component is $\lambda = 3 \times 10^{-9}$ /hour 2 points
- a) Determine $R(t)$ for t in hours
b) Find the 2-year reliability, MTTF in hours, and allowable operating time if the reliability is to be no less than 0.998.
- a. $\exp[-3 \times 10^{-9}t]$, 0.8888, 2.111×10^9 hours, 33.084 years
b. $\exp[-4 \times 10^{-9}t]$, 0.8888, 3.333×10^9 hours, 84.033 years
c. $\exp[-4 \times 10^{-9}t]$, 0.9999, 2.111×10^9 hours, 84.033 years
d. $\exp[-3 \times 10^{-9}t]$, 0.9999, 3.333×10^9 hours, 33.084 years
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
d.
- 8) Find the reliability of an electronic system for 150-hr operation, which has two independent failure modes, namely, a constant failure rate of 0.0002 and a linearly increasing failure rate given by 2 points
- $$\lambda(t) = 3 \times 10^{-5}t$$
- a. 0.7353
b. 0.5373
c. 0.3735
d. 0.3537
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
a.
- 9) Consider the seven-component system shown in Q.4. The reliabilities of the components are as follows: $R_A=0.96$, $R_B=0.92$, $R_C=0.94$, $R_D=0.89$, $R_E=0.95$, $R_F=0.88$, $R_G=0.90$. Find the reliability of the system. If you had a choice of improving system reliability by modifying any two components, how would you proceed? 2 points
- a. Improve reliabilities of A and B
b. Improve reliabilities of A and C
c. Improve reliabilities of B and C
d. Improve reliabilities of C and D
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
d.
- 10) An electromechanical system with three components in the series. Each component has a Weibull time-to-failure distribution with β equaling to 2. The characteristic life times for the three components are 10,000 hours, 15,000 hours, and 20,000 hour respectively. Determine the MTTF and the design life of the electromechanical system corresponding to a reliability of 0.95. 2 points
- a. 4811.918 hours, 1740.82 hours
b. 6811.918 hours, 1740.82 hours
c. 4811.918 hours, 1470.82 hours
d. 6811.918 hours, 1470.82 hours
- a.
 b.
 c.
 d.
- No, the answer is incorrect.
Score: 0
Accepted Answers:
b.