Module 9 Assignment

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**Question 6: The text refers to the *logistics and maintenance support infrastructure*. What is it and what is included?**

Logistics and maintenance support infrastructure is defined as and includes supply chain activities associated with purchasing and acquisition, manufacture and production, transportation and distribution, and installation as well as the sustainment activities around maintenance and support of the system through the entire life cycle.

**Question 10: Identify and describe at least three measures (metrics) that can be applied to each of the following:**

1. **Supply chain**
   1. Time to react in response to an identified need
   2. Total cost of processing an item through L&M support infrastructure
   3. Defect rate in terms of products delivered
2. **Purchasing and material flow**
   1. Time required to initiate and process a purchase order
   2. Meet the customer’s definition of on-time delivery
   3. Time required to process materials
3. **Transportation and packaging**
   1. Transportation time
   2. Transportation cost
   3. Is the packaging sufficiently strong (rugged)?
4. **Warehousing and distribution**
   1. Time required to ship a product
   2. Cost of each product shipment
   3. Cost of inventory holding and management
5. **Maintenance organization**
   1. Maintenance labor hours per system operating hour
   2. Maintenance labor hours per mission cycle
   3. Maintenance labor hours per month
6. **Training and training support** 
   1. Indirect labor time required to support maintenance (overhead)
   2. Personnel attrition rate (turnover)
   3. Worker-days of formal training per year (training)
7. **Spares, repair parts, and related inventories**
   1. Reliability of the item to be spared
   2. The quantity of items used
   3. The required probability that a spare wil be available when needed
8. **Test and support equipment**
   1. Time required on-station per day
   2. Test equipment utilization
   3. Queue length
9. **Maintenance facility**
   1. Item process time (turnaround)
   2. Ratio of facility time utilized to time available for use (utilization)
   3. Unit consumption of energy per maintenance action (energy utilization)
10. **Computer resources and maintenance software**
    1. Language complexity
    2. Failure rate of software (software reliability)
    3. Failure rate of equipment (equipment reliability)
11. **Technical data and logistics information** 
    1. Data access time
    2. Information processing time
    3. Cost of transmitting data

**Question 12: Assuming that a single component with a reliability of 0.85 is used in a unique application in the system and that there is one backup spare component, determine the probability of system success having a spare available in time, *t*, when required.**

Given λt = 0.163,

P = e−0.163 + (0.163)e−0.163   
P = 0.85 + (0.163)(0.85)   
P = 0.98855

**Question 16: An equipment unit contains 30 parts of the same type. The part has a predicted failure frequency of 10,000 hours. The equipment operates 24 hours a day and spares are procured at 90-day intervals. How many spares should be carried in the inventory to ensure a 95% probability of success?**

Given K = 30, λ = 0.0001, T = 90, P = 0.95, we determine that

KλT = 30×0.0001×90×24   
KλT = 6.48

Using Figure 15.8b on page 519 we find that the number of spares, s, required is approximately 11. This is supported by use of the formula (15.8) given on page 518, which yields the following table of values:

|  |  |
| --- | --- |
| **Number of Spares** | **Probability of Success** |
| 10 | 0.934271 |
| 11 | 0.966775 |
| 12 | 0.984327 |