

Final DEN 423

Name _____

All questions are 3 points each except as noted.

Score (out of 105): _____

Human Factors in the System

1. Name three of the key elements of an Operator Task Analysis.

- **Trigger/stimulus**
- **Action**
- **Feedback**

2. What does an Operation Sequence Diagram Display and what is its objective?

- Displays: **Flow of information between operators**
- Objective: **Evaluate interfaces for design development**

3. Name four of the metrics you would use to measure the effectiveness of a training program.

- **Task time**
- **Resource consumption**
- **Accuracy / errors**
- **Improvement in higher level objectives**
- **Savings in maintenance costs, number for accidents**

4. When evaluating the skill set of a population against the system requirements, name three concerns that may trigger redefining the whole architecture of the system:

- **Excessive number of personnel required**
- **High skill levels required**
- **High resource consumption**

5. According to Dr. Edwards Deming, what are the four reasons not to do performance appraisals of individuals?

- **Arbitrary and unjust**
- **Demoralizing to employees**
- **Nourishes short term performance**
- **Annihilates teamwork, encourages fear**
- **Unreliable and inconsistent**

Control Charts and Process Capability

6. Which of the following characteristics can be said of a Run Chart? (circle all the best answers)

- a. Displays data in a time sequence**
- b. Sets limits based on statistical trends in the data
- c. Can be used to show long term changes or stabilization of a process**
- d. Can indicate if data points are of “special cause”

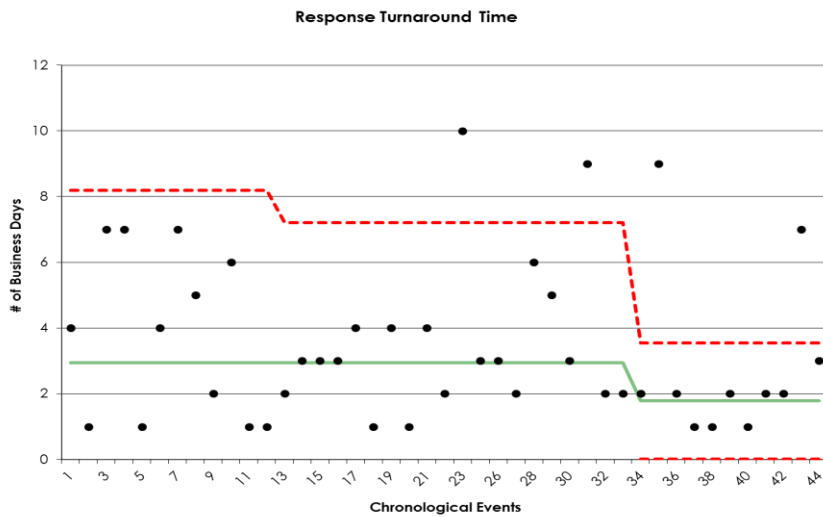
7. What are control limits? (circle the best answer)

- a. Limits set by engineers, outside of which the system will not perform correctly.
- b. Tolerances outside of which the process will no longer produce acceptable results.
- c. The bounds outside of which normal process variation is not expected.**
- d. The hard stops on a control device which prevent the operator from exceeding the physical machine limits.

8. Which of the following characteristics can be said of a Control Chart? (circle the best answer)

- a. Always shows straight horizontal control limits
- b. Shows statistically improbable data points that should be investigated to find out if they could be assigned to some special circumstances beyond the normal process**
- c. Shows long term trends
- d. Parts with measurements outside the control limits should always be rejected.

9. Looking at the following control chart, we can surmise that process changes took place after chronological points 12 and 33. Answer these questions (2 points each, total = 10):



- a. Did the change in the process after 12 affect the mean or the variance? variance (slightly)
- b. How many data points after 21 should be investigated for special cause? 4
(or 7 depending how you look at it)
- c. Which process change (12 or 33) had the greater effect to improve the process? 33
- d. Is a response turnaround time greater than 8 days out of spec (yes, no, maybe) maybe
- e. Explain your answer to d : There is no spec limit noted so we don't know if 8 days is good or bad. We just know that its probably undesirable since effort was made to change the process in order to reduce the upper control limit and the variance.

10. Given that a process does not produce results that are within specification, would it be easier to fix the situation if the process had common cause or special causes of variation? (circle the best answer)

- a. common cause
- b. **special cause**

11. In determining whether a fabrication process is capable of delivering functionally critical and process critical parameters within the design specifications, what is the minimum Cpk value that many companies will set as their requirement?

1.33

Logistics and Supportability

12. What's a disadvantage of having a single supplier providing parts or services for multiple Systems/Organizations within a company that has no central procurement function?

Conflict in priorities for capacity, cost , Quality, delivery

Single point of failure

13. Which of the following best defines Supply Chain Management? (circle the best answer)

- a. Planning how much inventory should be built and shipped.
- b. Management of information through business processes.
- c. Enabling financial transactions corresponding to inventory moves.
- d. Optimizing business processes to enable a "Perfect Order" delivered to the customer.
- e. **All of the above**

14. What is the main difficulty in implementing a Demand driven supply chain? (circle the best answer)

- a. Creating the market demand for the products
- b. **Providing instantaneous end to end information flow across the supply chain SOS**

- c. Getting the factory to retain financial ownership of inventory
- d. Cost of product tracking technologies

15. Match the best application for the technology by writing the number in the blank next to each of the following:

- 1 A. RFID
- 3 B. GPS
- 2 C. Barcode

1. Identification of many products nested within bulk inventory.
2. Identification of a single product where there is a visual line of site.
3. Identifying the physical location of a product when the device cost is not a factor.

16. Name five methods used for commercial transport of high volume non-fluidic products from factories to customers:

- Rail
- Truck
- Ocean
- Air
- Intermodal

17. Which mode of transportation is best suited for transport of high value products with large demand fluctuations?

- Air

18. If you had to pick just one comprehensive metric to measure supply chain effectiveness, what would it be?

Perfect Order

Producibility, Sustainability, Disposability

19. Provide an example of a product, component, or material for each of the following characteristics (1.5 points each):

- a) Reusable: plastic bag, computer
- b) Recyclable: water bottle
- c) Disposable with environmental impact: asbestos, batteries, nuclear waste
- d) Disposable with no environmental impact: food

20. Name two benefits that come with the application of Learning Curve Theory.

- winning competitive bids
- competitive pricing
- Resource planning
- Predictable cost of personnel
- Better pricing

21. Assembly times were measured for each successive product that was built showing the following impressive reduction in labor times for each successive unit. As illustrated, the first product took 1 hour to build and the second one only took 0.70 hours, etc. (5 points)

Unit Number	Unit Direct labor Hours
1	1.00
2	0.70
3	0.57
4	0.49
5	0.44
6	0.40
7	0.37
8	0.34

How long would you expect the build time to be for the 16th unit?

Calculations:

Answer: 0.24

$$0.7 \times .34 = 0.24$$

Could also use the complex equation given to get the same answer

22. Name 3 of the 6 manufacturing principles (best practices) discussed in class:

- **use gravity** _____
- **use fewer parts** _____
- **design for ease of fabrication (like looser tolerances)** _____
- **Reduce use of non-standard parts**
- **Add more functionality per part**
- **Assemble from one direction**
- **Design for assembly with standard tools**

23. Name two fabrication processes that are often used for high volume, low cost parts, at the expense of high tooling costs:

- **Injection molding** _____
- **progressive die stamping** _____

- Forming
- deforming

Planning and Organization

24. Given an organization that has really mature processes and functional capability, what kind of organizational structure would best improve the focus on projects and customers?

Project or Customer Org

25. Given an organization that is really in tune with their customers and easily manages project across functions, what kind of organizational structure would best improve their functional expertise?

Functional Org

26. What type of organizational structure will require you to manage the priorities of two different bosses?

matrix

27. Which of the following is the best way to handle a performance issue with an individual over which you have authority (positional or otherwise)? (circle the best answer)

- a) Talk to a higher-level manager and have them work it out.
- b) Evaluate the impact to the project and decide if it's a battle worth fighting.
- c) Save it for their performance evaluation.
- d) Immediately call them out on it and make it clear that you will not tolerate this kind of behavior.
- e) **Tell the individual what your expectation was, state what you observed, stop, and listen.**

Assessing Capability

28. Match the best Quality System standard to its application by writing the number in the blank next to each of the following:

 2 A. ISO 9001

 1 B. ISO 14001

 5 C. CMMI

 3 D. cGMP

 4 E. ISO/TS 16949

1. Any company making products, components, or services where they want to demonstrate to their customers a commitment to sustainability and the environment.
2. Contract Manufacturing factory in China where the customer wants to know that quality product will be built and shipped.
3. A company producing medical devices, drugs, or food products that wishes to continue doing business.
4. A supplier which wants to make parts for major automotive manufacturers.
5. A company which has their own successful method of doing business but wants to take it to the next level.

29. Name two (primary) things that suppliers need well documented from their customers:

- **performance expectations**_____
- **clear, concise, valid, manufacturable specifications**_____

30. According to the textbook, describe in a couple of words or more each of the five levels used in CMMI:

1. **initial** processes unpredictable, poorly controlled and reactive_
2. **Managed** Processes characterized for projects and is often reactive. _____
3. **Defined** Processes characterized for the organization and is proactive

4. **_Measured_** Processes measured and controlled_____
5. **_Optimized_** Focus on process improvement_____

31. Name three elements of a Quality Management System that you believe are most important:

- **_Management responsibility_**_____
- **_Management of resources_**_____
- **_Product realization_**_____
- **Measurement, analysis, and improvement of the QMS**
- **Data Management**
- **Quality objectives**
- **Quality manual**
- **Organizational structure**
- **Product Quality**
- **Continuous improvement including corrective and preventative action**

32. Name three elements of important in Supplier evaluation that you did not list in problem 31:

- **_Management responsibility_**_____
- **_Production control_**_____
- **_Inventory control_**_____
- **Quality Management**
- **Quality control**

Bonus question (3 points):

33. What is the first question to ask whenever faced with a new challenge?

What problem are we trying to solve?_____

*Grant others the same good intentions that we grant ourselves...
despite evidence to the contrary.*

Live long and prosper.