

Design for Manufacturing - 17ME744

IAT 1

Answer all the questions (50Marks)

16/10/2020 1.00 pm to 3.00pm

- 1 **The following is the source(s) for developing new or improved product**
 - A. Research and Development department of the enterprise
 - B. Consumer suggestions and Complaints
 - C. Other competitive products in the market
 - D. All of the above**

- 2 DFM is _____
 - A. Design for Machining
 - B. Design for Maintainability
 - C. Design for Manufacturing**
 - D. None of these

- 3 The reason of performing the Design for manufacturing process is to reduce the manufacturing cost at the design stage
 - A. True**
 - B. False

- 4 Behaviour of materials in the component is depends on
 - A. Component geometry
 - B. Manufacturing process
 - C. Stock materials
 - D. External forces
 - E. All the above**

- 5 Selecting the optimum combination of material and process can be performed by
 - A. Analysis of the performance requirements.
 - B. Development of alternative solutions to the problem.
 - C. Evaluation of the different solutions.
 - D. All the above**

6. The cost of the bar unit is
 - A. Cost per unit mass
 - B. Cost per strength
 - C. Cost per unit mass

D. Cost per unit strength

7. Relative cost $RC' = \{C'a/ C'b\}$ is > 1 , material a is preferable to material b
- A. True
B. False
8. In weighted property method the best value in the list rated as 100, then scaled property is
- A. $\frac{\text{Maximum Numerical value of property}}{\text{Maximum value in the list}} \times 100$
B. $\frac{\text{Numerical value of property}}{\text{Maximum value in the list}} \times 100$
C. $\frac{\text{Minimum value in the list}}{\text{Maximum Numerical value of property}} \times 100$
D. $\frac{\text{Minimum value in the list}}{\text{Numerical value of property}} \times 100$
9. The total number of possible decisions $N = n(n-1)/2$, where n is
- A. The number of the properties
B. The number of the samples
C. Goals under consideration
D. Both A & C
10. The limits on properties method are usually suitable for optimizing material and process selection when the number of possible alternatives is relatively low.
- A. True
B. False
11. DFM guidelines are
- A. Minimize secondary operations
B. Standardize design features
C. Standardize components
D. All the above
12. The tolerance range in Die casting is
- A. 1-10 mm
B. 0.1 – 1 mm
C. 0.01 – 1 mm
D. None of the above
13. If process capability $C_p > 1$ means
- A. The process variation exceeds specification, and a significant number of defects are being made.

- B. The process is just meeting specifications. A minimum of .3% defects will be made and more if the process is not centered.
- C. **The process variation is less than the specification; however, defects might be made if the process is not centered on the target value.**
- D. All the above
14. Cpk is used to estimate how close you are to a given target and how consistent you are to around your average performance.
- A. **True**
- B. False
15. Coefficient of Skewness is
- A. **Mean mode/ 1σ**
- B. Mean mode / 3σ
- C. Mean mode / 6σ
- D. None of the above
16. **Leptokurtic is**
- A. Fewer values in the tails and fewer values close to the mean (i.e. the curve has a flat peak and has more dispersed scores with lighter tails)
- B. **More values in the distribution tails and more values close to the mean (i.e. sharply peaked with heavy tails)**
- C. Distributions those are moderate in breadth and curves with a medium peaked height.
- D. All the above
17. Error distribution $u_1 = 0.051$; $u_2 = 0.076$; $u_3 = 0.152$; Part A has 1 truncated, Part B has 1.5 truncated, Part C has 2 truncated curve. Find the natural tolerance u , for end- to -end assembly.
- A. $\sigma_a = 0.0093$ mm & $u_a = 0.0288$ mm
- B. $\sigma_a = 0.93$ mm & $u_a = 0.288$ mm
- C. $\sigma_a = 0.093$ mm & $u_a = 0.088$ mm
- D. **$\sigma_a = 0.093$ mm & $u_a = 0.288$ mm**
18. The assembly tolerance u , for the three parts must be held to 0.508 mm. the designer decided that the tolerance on the second part should be twice as great as for the first part, and for the third part should be three times as great as for the first. Distributions are such that $a t = 0.440u$. Find the tolerance that should be specified for each part.
- A. $u_1 = 0.0104$ mm; $u_2 = 0.0208$ mm; $u_3 = 0.0312$ mm
- B. $u_1 = 0.108$ mm; $u_2 = 0.216$ mm; $u_3 = 0.324$ mm
- C. **$u_1 = 0.104$ mm; $u_2 = 0.208$ mm; $u_3 = 0.312$ mm**
- D. $u_1 = 0.04$ mm; $u_2 = 0.08$ mm; $u_3 = 0.12$ mm

19. Three parts are to be placed in end-to-end assembly. The tolerances are 0.2286 mm, 0.3048 mm and 0.9144 mm. Form an estimate for the variations in the lengths of the assemblies by using the arithmetic law
- A. **1.448 mm**
 - B. 14.48 mm
 - C. 0.1448 mm
 - D. None of the above
20. In 1.5σ Truncation, $\sigma =$
- A. 0.44u
 - B. **0.496u**
 - C. 0.546u
 - D. 0.5u
21. _____ helps in establishing the interchangeability of products
- A. **Standardization**
 - B. Simplification
 - C. Diversification
 - D. Specialization
22. Which of the following option is incorrect about Selective Assembly?
- A. **Need of close tolerances**
 - B. Reduced number of scraps
 - C. Low cost
 - D. High quality
23. In selective assembly, number of group is
- A. Process capability index / Tolerance desired
 - B. Tolerance / Process capability
 - C. **Process capability / Tolerance desired**
 - D. None of the above
24. **Limits of Size is decided by**
- A. functional requirement
 - B. interchangeability
 - C. production time and cost
 - D. **All the above**
25. Which of the following is a not Secondary machining operation?

- A. Facing
- B. Milling
- C. Parting
- D. Casting**

26. Which of the following option is incorrect about Laminated shims benefit

- A. Cost Savings
- B. Fewer items in related inventory storage space
- C. Reduced Assembly Time
- D. Dimensional accuracy with expensive machining**

27. Laminated shims are used in

- A. Hydraulic controls, refrigeration, and industrial ventilation machines
- B. Agricultural equipment
- C. Machine tools, Automotive, Aircraft & Aerospace markets
- D. All the above**

28. Match the following

- | | | | |
|---|-----------------------|----|-----------------|
| 1 | Problem definition | a) | Trade |
| 2 | Gathering Information | b) | QFD |
| 3 | Parametric design | c) | Sizing of parts |
| 4 | Configuration design | d) | Tolerances |

- A. 1-c, 2-a, 3-d, 4-b
- B. 1-c, 2-a, 3-b, 4-d
- C. 1-b, 2-a, 3-c, 4-d
- D. 1-b, 2-a, 3-d, 4-c**

29. Following factors that should be considered in component design

- A. Manufacturing Process & Functional requirement
- B. Manufacturing Process & Material properties
- C. Material properties & Customer requirement
- D. All the above**

30. Maximum allowance is obtained by subtracting the minimum shaft size from the largest hole size

- A. True**
- B. False

31. Effect of material properties based on design _____

- A. Stress Concentration Factor
- B. Static Strength
- C. Designing against Fatigue
- D. All the above**

32. The limits on properties method are usually suitable for optimizing material and process selection when the number of possible alternatives is relatively high.

- A. True**
- B. False

33. Mesokurtic is

- A. Fewer values in the tails and fewer values close to the mean (i.e. the curve has a flat peak and has more dispersed scores with lighter tails)
- B. More values in the distribution tails and more values close to the mean (i.e. sharply peaked with heavy tails)
- C. Distributions those are moderate in breadth and curves with a medium peaked height.**
- D. All the above

34. Platykurtic is

- A. Fewer values in the tails and fewer values close to the mean (i.e. the curve has a flat peak and has more dispersed scores with lighter tails)**
- B. More values in the distribution tails and more values close to the mean (i.e. sharply peaked with heavy tails)
- C. Distributions those are moderate in breadth and curves with a medium peaked height.
- D. All the above

35. In 1σ Truncation, $\sigma =$

- A. 0.44u**
- B. 0.496u
- C. 0.546u
- D. 0.5u

36. In 2σ Truncation, $\sigma =$

- A. 0.44u
- B. 0.496u
- C. 0.546u**
- D. 0.5u

37. If process capability $C_p < 1$ means

- A. **The process variation exceeds specification, and a significant number of defects are being made.**
 - B. The process is just meeting specifications. A minimum of .3% defects will be made and more if the process is not centered.
 - C. The process variation is less than the specification; however, defects might be made if the process is not centered on the target value.
 - D. All the above
38. If process capability $C_p = 1$ means
- A. The process variation exceeds specification, and a significant number of defects are being made.
 - B. **The process is just meeting specifications. A minimum of .3% defects will be made and more if the process is not centered.**
 - C. The process variation is less than the specification; however, defects might be made if the process is not centered on the target value.
 - D. All the above
39. Relative cost $RC' = \{C'a/ C'b\}$ is < 1 , material a is preferable to material b
- A. **True**
 - B. False
40. The tolerance range in Sand casting is
- A. **1-10 mm**
 - B. 0.1 – 1 mm
 - C. 0.01 – 1 mm
 - D. None of the above
41. The minimum allowance is the difference between the largest shaft and the smallest hole size
- A. **True**
 - B. False