Product Design and Manufacturing

Assignment Week-1

1. Which of the following process is currently used in product realization process?
   a) Analytical process
   b) Creative process
   c) Problem definition
   d) All of these

2. The extended team of designer and developer of the product is limited and remains small to meet in a conference room.
   a) True
   b) False

3. What is another term of products in business?
   a) Services
   b) Goods
   c) Merchandise
   d) Raw materials

4. _____ is defined as the production activity involving production of large quantity of same kind of product for a long period of time.
   a) Mass production
   b) Manufacturing capability
   c) Interchangeability
   d) Product life cycle

5. Analyzing the problem is the initial step in Krick's problem-solving process.
   a) True
   b) False

6. Which of the following is a disadvantage of evolution in product designing?
   a) Unsuitability for mass production
   b) Difficulty in modification
   c) Inability to tap new technologies
   d) All of these

7. What is the association between design and manufacturing functions often referred to as?
   a) Sequential Engineering
   b) Consecutive Engineering
   c) Simultaneous Engineering
   d) Isolated Engineering

8. _____ largely pushes the decision of product development to be made quickly without having detailed information?
   a) Economics
   b) Time pressure
   c) Dynamics
   d) Trade-off

9. Interchangeability ensures that parts can be replaced without any fitting adjustments.
   a) True
   b) False

10. What happens to the existing product when competitive products appear in market during the product life cycle?
   a) Sales decline
   b) Profits grows
   c) Maturity period extends
   d) Exponential growth

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Assignment Week-2

1. A target value for each parameter is set based on its importance and competitor's product.
   a) True
   b) False

2. What is the recommended balance for performance specifications while establishing functions in Engineering Design?
   a) They should not be extremely narrow
   b) They should be extremely broad
   c) They should not be narrow nor broad
   d) None of these

3. Which of the following is not an attribute of successful product development?
   a) Cost
   b) Value
   c) Distinctiveness
   d) Time

4. Operational aspects are often multiple, and usage of the product can be left to the customer's choice.
   a) True
   b) False

5. _____ is defined as the length of the service life or endurance of the product.
   a) Quality
   b) Dependability
   c) Durability
   d) None of these

6. Quality is an attribute that can be defined by two major factors:
   a) Durability and dependability
   b) Durability and cost
   c) Dependability and cost
   d) Cost and function

7. A product has certain properties like intrinsic, extrinsic, and physical form.
   a) True
   b) False

8. One way of generating performance specification while establishing functions in engineering design is through:
    a) Scree Plot
    b) House of Quality
    c) Design of Experiments
    d) Gantt chart

9. After completion of functional analysis in developing provisional designs, one must develop a matrix of sub functions as rows and possible solutions as columns.
    a) True
    b) False

10. In Design Thinking, which phase follows ‘ideation’?
    a) Define
    b) Test
    c) Prototype
    d) Empathize

Product Design and Manufacturing

Assignment Week-3

1. Which factor is not mentioned as affecting Aesthetic Design?
   a) Forms/shapes
   b) Material strength
   c) Proportions
   d) Colors

2. Basic elements of visual design are form, content, arrangement, light and color.
   a) True
   b) False

3. What is a “tint” in the context of color?
   a) A hue with added black
   b) A hue with added white
   c) A hue with added complement
   d) A pure hue without any additions

4. Which type of design utilizes shapes found in nature?
   a) Geometric
   b) Natural
   c) Abstract
   d) None of these

5. Creating contrast is not a consideration when adjusting size in the perception aspect.
   a) True
   b) False

6. Which type of balance is created through a/an axis-point/visual-centre/balance-centre?
   a) Symmetric balance
   b) Asymmetric balance
   c) Radial balance
   d) None of these

7. _____ is a process of creating non-identical instances by adjusting attributes.
   a) Variation
   b) Pattern
   c) Repetition
   d) None of these

8. What is the primary goal of emphasis in design?
    a) Achieving a monochromatic look
    b) Creating a balance series of emphases
    c) Using all available colors
    d) Minimizing contrast

9. Inclined lines and curves are used to generate a unity concept in the form of shapes of the product.
    a) True
    b) False

10. What suggests the concept “NO ART for ART SAKE”?
    a) Variety
    b) Function
    c) Unity
    d) None of these

Product Design and Manufacturing

Assignment Week-4

1. In 350BC, value is classified into how many classes?
   a) Five
   b) Six
   c) Seven
   d) Eight

2. High-value elements in Relative Importance are characteristics that need to be prioritized and worked on.
   a) True
   b) False

3. What is the reason for poor value?
   a) Poor communication
   b) Lack of consensus
   c) Incorrect assumptions
   d) All of these

4. The Development Phase selects and refines the best ideas to develop into specific value improvement recommendations only.
   a) True
   b) False

5. The Value Engineering methodology not only curtail costs but also benefits to improve:
   a) Time
   b) Performance
   c) Quality
   d) All of these

6. Value Engineering cannot be applied at any point of the design or process.
   a) True
   b) False

7. _____ is which makes a product ‘work or sell’.
   a) Value
   b) Cost
   c) Function
   d) Worth

8. Functions are only classified as ‘Primary Functions’ at the assembly level.
    a) True
    b) False

9. The _____ Matrix is made to finally select the suitable alternative by ranking.
    a) Decision
    b) Indifference
    c) VIP
    d) Function Cost

10. _____value is the fundamental reason for creation of product, process, service, or system.
    a) Exchange
    b) Use
    c) Esteem
    d) Cost

Product Design and Manufacturing

Assignment Week-5

1. What are the factors that affect the material selection process?
   a) Mechanical factor
   b) Physical factor
   c) Cost and availability
   d) All of these

2. Shrinkage on cooling and curing of thermoset plastics can be completely neglected while designing parts.
   a) True
   b) False

3. _____ is a cutting process in which material is removed by a rotating multiple-tooth cutter.
   a) Turning
   b) Machining
   c) Milling
   d) Grinding

4. In extrusion process, _____ are forced by a mechanically or hydraulically actuated ram through a die hole of the desired shape or around a punch.
   a) chips
   b) filament
   c) metal billets
   d) None of these

5. In Design Guidelines for Metal Stamping, the spacing between holes should be a minimum of twice the stock thickness.
   a) True
   b) False

6. Which of the following is an advantage of heat treatment?
   a) Refines internal stress
   b) Improves toughness
   c) Refines the gain size
   d) All of these

7. _____ is achieved when thermal energy from electrical discharges between the wire and the workpiece occur.
   a) Cavity type EMD
   b) Wire cutting
   c) Grinding
   d) Cycle time

8. Profit is not required for a business enterprise to remain viable in product costing.
    a) True
    b) False

9. Which cost of actual labour is used to produce the product?
    a) Overhead cost
    b) Direct labour cost
    c) Prime cost
    d) Manufacturing cost

10. What is the recommended minimum draft angle when working with titanium?
    a) 2-5 degree
    b) 5-7 degree
    c) 7-9 degree
    d) 10-12 degree

Product Design and Manufacturing

Assignment Week-6

1. What does DFM stand for in product designing?
   a) Design for Marketing
   b) Design for Management
   c) Design for Manufacturing
   d) Design for Maintenance

2. Design for Manufacturing does not play a role in the post-production phases, such as service and repair.
   a) True
   b) False

3. _____ focuses on reduction and standardization of parts, sub-assemblies and assemblies.
   a) Design for Manufacturing
   b) Design for Assembly
   c) Both of these
   d) None of these

4. Flexible components are generally more difficult to handle and assemble.
   a) True
   b) False

5. In which of the following assembly methods, the assembly of individual components into the final product takes place with aid of hand tools.
   a) Manual assembly
   b) Robotic assembly
   c) Automatic assembly
   d) None of these

6. Assembly analysis consists of determining the:
   a) Magnitude of force
   b) Tooling requirements
   c) Time and personnel
   d) All of these

7. In target disassembly sequence, specific components are disassembled to remove valuable components.
   a) True
   b) False

8. _____is the degree of facility with which an equipment or system is capable of being retained in, or restored to, serviceable operation.
   a) Operability
   b) Maintainability
   c) Affordability
   d) Durability

9. Which of the following is NOT a major component of Total Productive Maintenance (TPM)?
   a) Machines
   b) Employees
   c) Financial system
   d) Processes

10. For planning a system review, a peer reviewer focuses solely on the firm's financial performance during a system review.
   a) True
   b) False

Product Design and Manufacturing

Assignment Week-7

1. Product Design for the environment is a design approach for reducing the impact of products on the environment.
   a) True
   b) False

2. What is being developed to support 'design for the environment' as a practice?
   a) Market forces
   b) Product regulations
   c) Standards
   d) Product team

3. Which factor is crucial in determining the quality of a product?
   a) Performance
   b) Aesthetics
   c) Reliability
   d) All of these

4. Control charts for attributes are used to monitor characteristics that:
   a) Can be measured
   b) Have discrete value
   c) Are categorical
   d) All of these

5. For process capability study, variables control charts are almost always preferable to attributes control charts.
   a) True
   b) False

6. Which of the following methods is connected with inspection and testing of product.
   a) Design experiments
   b) Acceptance sampling
   c) Statistical process control
   d) None of these

7. What is the constant g in this equation called: $y_{t+1} - T = gx$?
   a) Target
   b) Deviation
   c) Process gain
   d) Disturbance

8. _____ diagram is a useful technique for further analysis of nonconformities.
    a) Scree
    b) Gantt
    c) Cause and effect
    d) FAST

9. From the product design point of view, developing products that use less energy will help mitigate the environment problem.
    a) True
    b) False

10. The design for environment is practiced due to:
    a) Customer Demand
    b) Government Pressure
    c) ISO Requirement
    d) All of these

Product Design and Manufacturing

Assignment Week-8

1. _____ is the ability to conceive something unpredictable, original and unique.
   a) Innovation
   b) Creativity
   c) Patent
   d) Copyright

2. The aim of analytical approach is to reach the final solution through a standard step-by-step procedure.
   a) True
   b) False

3. During the 'Preparation' step of creative process, what activities are emphasized?
   a) Sorting and combining
   b) Information gathering and fact-finding
   c) Synthesis ideas
   d) Evaluation of solutions

4. What is the significance of the 'Why' questioning for problem-solving in the creativity techniques?
   a) It limits analysis to surface –level issues
   b) It encourages deep analysis of problems
   c) It avoids the need for an action plan
   d) It focuses on when the problem occurred

5. Constructive discontent is characterized by a lack of interest in improving existing conditions.
   a) True
   b) False

6. What is the first challenge in Frugal innovation?
   a) Government norms
   b) Resource constraints
   c) Lack of purchasing power
   d) Poor customer response

7. Which of the following is an example of frugal innovation?
   a) Mitticool
   b) Luxury refrigerator
   c) High-cost washing machine
   d) Modern farming equipment

8. Crawford slip writing technique is a type of individual brainstorming.
    a) True
    b) False

9. Which of the following is a collection or document or list or thought that consist of a collection of problem in morphological analysis?
    a) Problem
    b) Dimension
    c) Policy problem
    d) Issue

10. Which is not a type of patent?
    a) Utility patent
    b) Design patent
    c) Synchronization patent
    d) Plant patent

Product Design and Manufacturing

Assignment Week-9

1. Which approach is commonly used in Rapid Prototyping for creating parts?
   a) Subtractive manufacturing
   b) Additive manufacturing
   c) Injection molding
   d) Casting

2. The accuracy of the final part is not influenced by any factors in the Rapid Prototyping process.
   a) True
   b) False

3. Which modeling technique is considered an extension of traditional drafting methods?
   a) Surface modeling
   b) Wireframe modeling
   c) Solid modeling
   d) Geometric modeling

4. Which format is commonly used to export the 3D model from the CAD package in the Rapid Prototyping?
   a) OBJ
   b) STL
   c) STEP
   d) IGES

5. What is the generally order of the layer thickness in the Multi Jet Modelling (MJM) machine?
   a) 10 µm
   b) 20 µm
   c) 40 µm
   d) 60 µm

6. In Shape Deposition Manufacturing (SDM), how is the workpiece transferred between stations?
   a) Conveyor belt
   b) Manual handling
   c) Robotic bed system
   d) Magnetic levitation

7. During stereolithography, the part is brought down to one layer thickness underneath the surface and left until the fluid has settled.
   a) True
   b) False

8. Gas Phase Deposition (GPD) involves disintegrating atoms of a receptive gas using a laser to create a solid.
   a) True
   b) False

9. Which rapid prototyping process involves semi-polymerized foils and UV light exposure for layer bonding?
   a) Three-Dimensional printing (3DP)
   b) Laminated Object Manufacturing (LOM)
   c) Paper Lamination Technology (PLT)
   d) Solid Foil Polymerization (SFP)

10. Rapid Prototyping applications include Engineering Design, analysis, planning and _____.
   a) tooling
   b) powder
   c) electronic laser
   d) None of these

Product Design and Manufacturing

Assignment Week-10

1. _____ is the most effective physical arrangement, either existing or in plans of industries.
   a) Function layout
   b) Plant layout
   c) Line layout
   d) None of these

2. Variations in the size of department is not a relevant factor for conducting a plant layout study.
   a) True
   b) False

3. Process layouts are discovered essentially in:
   a) Work shops
   b) Firms
   c) Low-volume items
   d) All of these

4. The framework of _____ is in danger from hardware breakdown, non-attendance and downtime because of preventive maintenance.
   a) plant layout
   b) process layout
   c) product layout
   d) cellular layout

5. Product layout efficiency is frequently improved using line balancing.
   a) True
   b) False

6. What is the primary function of the extruder in a TECHB FDM printer?
   a) Cooling the printed layers
   b) Feeding and melting the filament
   c) Controlling layer adhesion
   d) Positioning the 3D model on the build platform

7. What is the function of the slicer software in the TECHB FDM printing process?
   a) Controlling filament extrusion speed
   b) Slicing the 3D model into layers for printing
   c) Changing layer height
   d) Enhancing print preview accuracy

8. Which parameter in Cura controls the temperature of the extruder and heated bed during printing?
    a) Infill Temperature
    b) Print Speed
    c) Initial Layer Flow
    d) Printing Temperature

9. In the slicing software, what does ‘slicing’ refer to?
    a) Dividing the 3D model into layers
    b) Changing the model's color
    c) Adding support structures
    d) Adjusting print speed

10. For most fixed position layouts, the work zone might be crowded with as little storage room.
    a) True
    b) False

Product Design and Manufacturing

Assignment Week-11

1. What is the primary goal of Computer Integrated Manufacturing (CIM) in manufacturing?
   a) Lowering cost
   b) Improving delivery times
   c) Enhancing quality
   d) All of these

2. Plant layout is the way the equipment is physically arranged in the factory.
   a) True
   b) False

3. What is included in the business function of manufacturing support?
   a) Research and development
   b) Process planning
   c) Sales and marketing
   d) Quality control

4. Automated machine tools are primarily used for product design in manufacturing.
   a) True
   b) False

5. Which of the following manufacturing industries involve the cultivation and exploitation of natural resources?
   a) Secondary industries
   b) Tertiary industries
   c) Quaternary industries
   d) Primary industries

6. _____ involves observing of the product during actual operation or under conditions that might occur during operation.
   a) Inspection
   b) Testing
   c) Product variety
   d) None of these

7. What does MLT stand for in manufacturing?
   a) Manufacturing Lead Time
   b) Machine Learning Time
   c) Material Loading Time
   d) Manufacturing Labor Time

8. There is a direct relationship between production quantity and product variety in factory operations.
   a) True
   b) False

9. Which of the following parameters is typically used in mechanical engineering for CAE simulations?
   a) Temperature
   b) Pressure
   c) Component interactions
   d) All of these

10. The set of instructions that controls a machine's actions including speed, feed rate, coolants etc. are called _____.
   a) M-code
   b) G-code
   c) D-code
   d) N-code

Product Design and Manufacturing

Assignment Week-12

1. If a product is patented, it is not required to undergo Reverse Engineering.
   a) True
   b) False

2. What is the second step in the Reverse Engineering process after digitization?
   a) Creation of a CAD model
   b) Prototype development
   c) Processing of measuring data
   d) Digitization of the object/data capturing

3. How can the scan be improved once a rough 3D reconstruction has been obtained?
   a) By reducing the number if views
   b) By skipping the acquisition of missing parts
   c) By adding more views corresponding to missing parts
   d) By changing the light pattern

4. Alignment is a phase where range images acquired at different lengths from the object are brought to the same reference system.
   a) True
   b) False

5. What is the primary purpose of 'Mesh Decimation' in the described process?
   a) Increasing the number of mesh triangles
   b) Enforcing a tolerance for rough surface imperfections
   c) Reducing the number of mesh triangles
   d) Creating larger file sizes

6. Which of the following is the main technology for Reverse Engineering data acquisition?
   a) Contact
   b) Non-contact
   c) Destructive
   d) All of these

7. Which data collection technique involves point-to-point sensing with touch-trigger probes?
   a) Articulate sensing
   b) Analogue sensing
   c) Continuous sensing
   d) Pont-to-point sensing

8. Fast digitization of substantial volumes is a disadvantage of non-contact Reverse Engineering.
    a) True
    b) False

9. _____ is a way to go backstage and watch another company's performance from the wings, where all stage tricks and hurried realignments are visible.
    a) Reverse Engineering
    b) Benchmarking
    c) Outsourcing
    d) Mass customization

10. Strong relations between company and customers are one of the advantages of mass customization.
    a) True
    b) False