Chapter 06

Process Selection and Facility Layout

**True / False Questions**

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| 1. | Continuous processing is the best way to produce customized output.    True    False |

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| 2. | As a general rule, continuous processing systems produce products for inventory rather than for customer order.    True    False |

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| 3. | A job-shop processing system generally requires less-skilled workers than a continuous processing system.    True    False |

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| 4. | Avoiding bottlenecks is the primary goal of product design.    True    False |

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| 5. | In general, job-shop systems have a lower unit cost than continuous systems do because continuous systems use costly specialized equipment.    True    False |

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| 6. | Continuous production has been a significant factor underpinning the U.S. standard of living over the last century.    True    False |

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| 7. | Right-sized equipment tends to be larger than equipment used in traditional process layouts.    True    False |

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| 8. | Intermittent processing can take the form of batch processing or a job shop.    True    False |

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| 9. | The term "computer-aided manufacturing" refers primarily to the use of robotics in process control.    True    False |

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| 10. | Flexible manufacturing systems bring the benefits of automation to continuous processes.    True    False |

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| 11. | Repetitive processing systems usually produce goods specifically for customer orders rather than for inventory.    True    False |

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| 12. | Morale problems can be a reason for redesign of a facility layout.    True    False |

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| 13. | There are three basic process types: input, processing, and output.    True    False |

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| 14. | A cafeteria line would be an example of a process-focused layout.    True    False |

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| 15. | A possible disadvantage of a product layout is an inflexible system.    True    False |

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| 16. | Product layouts involve high utilization of labor and equipment.    True    False |

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| 17. | A manufacturing cell allows the production of a wide range of very different products.    True    False |

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| 18. | Product layouts can more easily adapt to variations in product requirements than process layouts can.    True    False |

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| 19. | Process layouts feature departments or other functional groupings of personnel or equipment.    True    False |

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| 20. | Information technology refers to competitive data.    True    False |

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| 21. | A process layout is more susceptible to shutdowns caused by equipment breakdowns than a product layout.    True    False |

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| 22. | Accounting, purchasing, and inventory control are fairly routine with process layouts.    True    False |

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| 23. | A disadvantage of a product layout can be high in-process inventory costs.    True    False |

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| 24. | In cellular manufacturing, machines and equipment are grouped by type (e.g., all grinders are grouped into a cell).    True    False |

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| 25. | Among the benefits claimed for cellular manufacturing are less material handling and reduced setup time.    True    False |

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| 26. | Group technology is closely connected to cellular manufacturing.    True    False |

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| 27. | The percentage of idle time in an assembly line is called cycle time.    True    False |

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| 28. | Mismatches between operational capabilities and market demand can have a negative impact on an organization.    True    False |

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| 29. | Service layouts must be visually pleasing as well as functional.    True    False |

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| 30. | "Balance delay" is another name for the percentage of idle time in a product layout.    True    False |

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| 31. | "Balance delay" is another name for the percentage of idle time in a process layout.    True    False |

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| 32. | For a production line, daily capacity can be determined by dividing the daily operating time by the line's cycle time.    True    False |

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| 33. | The minimum number of workstations for a production line is determined in part by the desired output rate.    True    False |

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| 34. | The goal of line balancing is to assign tasks to workstations in such a way that the workstations have approximately equal time requirements.    True    False |

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| 35. | An idle percentage of zero means a line is perfectly balanced.    True    False |

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| 36. | None of the approaches to line balancing, manual or computerized, guarantees an optimal solution.    True    False |

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| 37. | Heuristic approaches to line balancing are the only approach that will guarantee an optimal solution.    True    False |

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| 38. | The main issue in the design of process layouts concerns the relative positioning of the departments involved.    True    False |

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| 39. | An advantage of a U-shaped production line is that it facilitates teamwork and flexibility in work assignments.    True    False |

**Multiple Choice Questions**

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| 40. | Key aspects of the process selection challenge include \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | information technology; marketing strategy |  |  |  | | --- | --- | | B. | process flexibility; marketing strategy |  |  |  | | --- | --- | | C. | capital intensity; process flexibility |  |  |  | | --- | --- | | D. | marketing strategy; operations strategy |  |  |  | | --- | --- | | E. | capacity planning; marketing strategy | |

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| 41. | When new products or services are being planned, process selection occurs as a matter of course. Process selection also comes into play as a result of:  (I) technological changes. (II) competitive pressures. (III) fundamental changes in demand patterns.      |  |  | | --- | --- | | A. | I only |  |  |  | | --- | --- | | B. | II only |  |  |  | | --- | --- | | C. | III only |  |  |  | | --- | --- | | D. | I and II but not III |  |  |  | | --- | --- | | E. | I, II, and III | |

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| 42. | Process choice is \_\_\_\_\_\_\_\_\_ driven.      |  |  | | --- | --- | | A. | demand |  |  |  | | --- | --- | | B. | operations |  |  |  | | --- | --- | | C. | marketing |  |  |  | | --- | --- | | D. | process |  |  |  | | --- | --- | | E. | capacity | |

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| 43. | The key questions in the process selection task are:  (I) How will the product/service be priced? (II) How much variety will be imposed on the process? (III) What is the target market for the product/service? (IV) At what volume will the process need to operate?      |  |  | | --- | --- | | A. | I and III |  |  |  | | --- | --- | | B. | II and IV |  |  |  | | --- | --- | | C. | II and III |  |  |  | | --- | --- | | D. | I and IV |  |  |  | | --- | --- | | E. | III and IV | |

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| 44. | Job shops tend to be \_\_\_\_\_\_\_\_\_\_ while continuous processes tend to be \_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | in services; in manufacturing |  |  |  | | --- | --- | | B. | short-term and capital intensive; long-term and labor intensive |  |  |  | | --- | --- | | C. | small scale and flexible; large-scale and inflexible |  |  |  | | --- | --- | | D. | standardized; customized |  |  |  | | --- | --- | | E. | low cost-per-unit; high cost-per-unit | |

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| 45. | The estimation of costs is generally most difficult when the \_\_\_\_\_\_\_\_\_\_\_ process has been chosen.      |  |  | | --- | --- | | A. | project |  |  |  | | --- | --- | | B. | repetitive |  |  |  | | --- | --- | | C. | continuous |  |  |  | | --- | --- | | D. | batch |  |  |  | | --- | --- | | E. | job shop | |

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| 46. | In an environment in which demand is both substantial and stable, \_\_\_\_\_\_\_\_\_\_ technology tends to be the best choice.      |  |  | | --- | --- | | A. | batch production |  |  |  | | --- | --- | | B. | fixed automation |  |  |  | | --- | --- | | C. | project production |  |  |  | | --- | --- | | D. | programmable automation |  |  |  | | --- | --- | | E. | flexible automation | |

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| 47. | Computer-integrated manufacturing integrates \_\_\_\_\_\_\_\_\_\_\_\_\_\_ with manufacturing.      |  |  | | --- | --- | | A. | information from across the organization |  |  |  | | --- | --- | | B. | demand forecasts |  |  |  | | --- | --- | | C. | marketing strategy |  |  |  | | --- | --- | | D. | human resources |  |  |  | | --- | --- | | E. | inventory levels | |

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| 48. | Which of the following is not a process commonly considered in making products or delivering services?      |  |  | | --- | --- | | A. | continuous |  |  |  | | --- | --- | | B. | batch |  |  |  | | --- | --- | | C. | repetitive |  |  |  | | --- | --- | | D. | job shop |  |  |  | | --- | --- | | E. | subcontracting | |

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| 49. | The type of processing system which is used for highly standardized products is:      |  |  | | --- | --- | | A. | continuous. |  |  |  | | --- | --- | | B. | intermittent. |  |  |  | | --- | --- | | C. | project. |  |  |  | | --- | --- | | D. | batch. |  |  |  | | --- | --- | | E. | unit. | |

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| 50. | Cellular layout is a term associated with:      |  |  | | --- | --- | | A. | wireless telecommunication. |  |  |  | | --- | --- | | B. | part families. |  |  |  | | --- | --- | | C. | functional (or process) layouts. |  |  |  | | --- | --- | | D. | assembly lines. |  |  |  | | --- | --- | | E. | job shops. | |

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| 51. | The substitution of machinery that has sensing and control devices for human labor is best described by the term:      |  |  | | --- | --- | | A. | automation. |  |  |  | | --- | --- | | B. | feedback control. |  |  |  | | --- | --- | | C. | computer-aided manufacturing. |  |  |  | | --- | --- | | D. | computer-integrated manufacturing. |  |  |  | | --- | --- | | E. | flexible manufacturing system. | |

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| 52. | Computer-aided manufacturing refers to the use of computers in:      |  |  | | --- | --- | | A. | product design. |  |  |  | | --- | --- | | B. | decision making. |  |  |  | | --- | --- | | C. | data analysis. |  |  |  | | --- | --- | | D. | quality control. |  |  |  | | --- | --- | | E. | process control. | |

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| 53. | A group of machines including supervisory computer control, automatic material handling, and possibly robots is called:      |  |  | | --- | --- | | A. | computer-aided design. |  |  |  | | --- | --- | | B. | a manufacturing cell. |  |  |  | | --- | --- | | C. | computer-aided manufacturing. |  |  |  | | --- | --- | | D. | computer-integrated manufacturing. |  |  |  | | --- | --- | | E. | a flexible manufacturing system. | |

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| 54. | In which type of operation are you likely to see, at most, only minor variations in the product or service being produced using the same process and the same equipment?      |  |  | | --- | --- | | A. | a project |  |  |  | | --- | --- | | B. | a job shop |  |  |  | | --- | --- | | C. | repetitive production |  |  |  | | --- | --- | | D. | batch processing |  |  |  | | --- | --- | | E. | intermittent production | |

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| 55. | The process of assigning tasks to workstations in such a way that the workstations have approximately equal time requirements is called:      |  |  | | --- | --- | | A. | fair employment practices. |  |  |  | | --- | --- | | B. | idle time analysis. |  |  |  | | --- | --- | | C. | line balancing. |  |  |  | | --- | --- | | D. | cycle time optimization. |  |  |  | | --- | --- | | E. | capacity cycling. | |

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| 56. | An operations strategy for process selection should recognize that:      |  |  | | --- | --- | | A. | process selection seldom requires technical expertise. |  |  |  | | --- | --- | | B. | engineering "white elephants" are uncommon. |  |  |  | | --- | --- | | C. | there is little need to manage technology. |  |  |  | | --- | --- | | D. | flexibility is not always the best choice. |  |  |  | | --- | --- | | E. | most technical skills can be contracted out to consultants. | |

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| 57. | Layout planning is required because of:  (I) efficient operations. (II) accidents or safety hazards. (III) new products or services. (IV) morale problems.      |  |  | | --- | --- | | A. | I and II |  |  |  | | --- | --- | | B. | II and IV |  |  |  | | --- | --- | | C. | I and III |  |  |  | | --- | --- | | D. | II, III, and IV |  |  |  | | --- | --- | | E. | I, II, III, and IV | |

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| 58. | The advantages of automation include:  (I) reduced output variability. (II) reduced variable costs. (III) machines don't strike or file grievances. (IV) machines are always less expensive than human labor.      |  |  | | --- | --- | | A. | I and IV |  |  |  | | --- | --- | | B. | II and III |  |  |  | | --- | --- | | C. | I, II, and III |  |  |  | | --- | --- | | D. | I and III |  |  |  | | --- | --- | | E. | II and IV | |

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| 59. | As compared to rigid automation, the benefits of flexible manufacturing systems include:      |  |  | | --- | --- | | A. | reduced labor requirements. |  |  |  | | --- | --- | | B. | higher efficiency. |  |  |  | | --- | --- | | C. | larger batch sizes. |  |  |  | | --- | --- | | D. | significantly lower fixed costs. |  |  |  | | --- | --- | | E. | significantly lower variable costs. | |

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| 60. | Which type of processing system tends to produce the most product variety?      |  |  | | --- | --- | | A. | assembly |  |  |  | | --- | --- | | B. | job shop |  |  |  | | --- | --- | | C. | batch |  |  |  | | --- | --- | | D. | continuous |  |  |  | | --- | --- | | E. | project | |

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| 61. | In which type of processing system would gasoline be produced from crude oil?      |  |  | | --- | --- | | A. | job shop |  |  |  | | --- | --- | | B. | batch |  |  |  | | --- | --- | | C. | assembly |  |  |  | | --- | --- | | D. | continuous |  |  |  | | --- | --- | | E. | project | |

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| 62. | Which of the following is not a characteristic of layout decisions in system design?      |  |  | | --- | --- | | A. | substantial investment of both money and effort |  |  |  | | --- | --- | | B. | long-term commitment |  |  |  | | --- | --- | | C. | significant impact on short-term efficiency |  |  |  | | --- | --- | | D. | usually well received by operative personnel |  |  |  | | --- | --- | | E. | can affect supplier or customer processes | |

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| 63. | An example of automated services is:      |  |  | | --- | --- | | A. | online banking. |  |  |  | | --- | --- | | B. | build your own pizza. |  |  |  | | --- | --- | | C. | haircuts. |  |  |  | | --- | --- | | D. | massage parlors. |  |  |  | | --- | --- | | E. | financial advising. | |

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| 64. | Which one of the following is not common to product layouts?      |  |  | | --- | --- | | A. | a high rate of output |  |  |  | | --- | --- | | B. | specialization of labor |  |  |  | | --- | --- | | C. | low unit costs |  |  |  | | --- | --- | | D. | ability to adjust to changes in demand |  |  |  | | --- | --- | | E. | special-purpose technology | |

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| 65. | Which one of the following is not considered an important factor in service layout design?      |  |  | | --- | --- | | A. | cost minimization and product flow |  |  |  | | --- | --- | | B. | frequency of orders |  |  |  | | --- | --- | | C. | customer attitude and image |  |  |  | | --- | --- | | D. | intensity of contact with the customer |  |  |  | | --- | --- | | E. | customer preferences with regard to variety | |

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| 66. | The type of layout which features departments or other functional groupings in which similar activities are performed is:      |  |  | | --- | --- | | A. | process. |  |  |  | | --- | --- | | B. | product. |  |  |  | | --- | --- | | C. | fixed-position. |  |  |  | | --- | --- | | D. | mass. |  |  |  | | --- | --- | | E. | unit. | |

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| 67. | Which of the following is not true about process layouts when they are compared to product layouts?      |  |  | | --- | --- | | A. | higher in-process inventories |  |  |  | | --- | --- | | B. | lower span of supervision |  |  |  | | --- | --- | | C. | lower rates of output |  |  |  | | --- | --- | | D. | more involved cost accounting |  |  |  | | --- | --- | | E. | lower unit costs | |

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| 68. | The type of layout in which workers, materials, and equipment are moved to the product as needed is:      |  |  | | --- | --- | | A. | process. |  |  |  | | --- | --- | | B. | product. |  |  |  | | --- | --- | | C. | fixed-position. |  |  |  | | --- | --- | | D. | batch. |  |  |  | | --- | --- | | E. | mass. | |

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| 69. | The grouping of equipment by the operations needed to perform similar work for part families is:      |  |  | | --- | --- | | A. | product layout. |  |  |  | | --- | --- | | B. | cellular manufacturing layout. |  |  |  | | --- | --- | | C. | functional layout. |  |  |  | | --- | --- | | D. | fixed-position layout. |  |  |  | | --- | --- | | E. | process layout. | |

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| 70. | Which term is most closely associated with cellular manufacturing?      |  |  | | --- | --- | | A. | part families |  |  |  | | --- | --- | | B. | assembly line |  |  |  | | --- | --- | | C. | robotics |  |  |  | | --- | --- | | D. | CAD |  |  |  | | --- | --- | | E. | CAM | |

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| 71. | Laser technology used in surgical procedures is an example of technological advances in:      |  |  | | --- | --- | | A. | product. |  |  |  | | --- | --- | | B. | facility layout. |  |  |  | | --- | --- | | C. | process. |  |  |  | | --- | --- | | D. | information. |  |  |  | | --- | --- | | E. | reverse engineering. | |

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| 72. | Product profiling links key product or service requirements to:      |  |  | | --- | --- | | A. | market conditions. |  |  |  | | --- | --- | | B. | order sizes. |  |  |  | | --- | --- | | C. | pricing strategies. |  |  |  | | --- | --- | | D. | schedule changes. |  |  |  | | --- | --- | | E. | process capabilities. | |

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| 73. | Layout design has many objectives, one of which is:      |  |  | | --- | --- | | A. | reduce bottlenecks. |  |  |  | | --- | --- | | B. | move materials and workers simultaneously. |  |  |  | | --- | --- | | C. | use workers and space efficiently. |  |  |  | | --- | --- | | D. | hold material handling costs to 27 percent or less. |  |  |  | | --- | --- | | E. | install computer terminals every 500 feet. | |

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| 74. | Which phrase most closely describes flexible manufacturing systems?      |  |  | | --- | --- | | A. | a variation of CAD |  |  |  | | --- | --- | | B. | a more fully automated version of cellular manufacturing |  |  |  | | --- | --- | | C. | manufacturing resource planning |  |  |  | | --- | --- | | D. | a process layout with a manufacturing overlay |  |  |  | | --- | --- | | E. | an approach that allows workers to begin work at a time of their choosing | |

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| 75. | A service organization (for example, a hospital) is likely to use a(n) \_\_\_\_\_\_\_\_ layout because of variability in customer processing requirements.      |  |  | | --- | --- | | A. | project |  |  |  | | --- | --- | | B. | process |  |  |  | | --- | --- | | C. | flow |  |  |  | | --- | --- | | D. | assembly |  |  |  | | --- | --- | | E. | nonrepetitive | |

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| 76. | In a product layout, the task of deciding how to assign work to specific stations is referred to as:      |  |  | | --- | --- | | A. | process balancing. |  |  |  | | --- | --- | | B. | task allocation. |  |  |  | | --- | --- | | C. | line balancing. |  |  |  | | --- | --- | | D. | work allocation. |  |  |  | | --- | --- | | E. | station balancing. | |

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| 77. | The minimum possible cycle time in a product layout is determined by the:      |  |  | | --- | --- | | A. | longest task time. |  |  |  | | --- | --- | | B. | shortest task time. |  |  |  | | --- | --- | | C. | average task time. |  |  |  | | --- | --- | | D. | total task time. |  |  |  | | --- | --- | | E. | per-unit setup time. | |

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| 78. | A production line is to be designed for a job with three tasks. The task times are .4 minutes, 1.2 minutes, and .5 minutes. The maximum cycle time in minutes is:      |  |  | | --- | --- | | A. | .3. |  |  |  | | --- | --- | | B. | .7. |  |  |  | | --- | --- | | C. | 1.4. |  |  |  | | --- | --- | | D. | 2.1. |  |  |  | | --- | --- | | E. | .8. | |

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| 79. | A production line is to be designed for a job with three tasks. The task times are .3 minutes, 1.4 minutes, and .7 minutes. The minimum cycle time in minutes is:      |  |  | | --- | --- | | A. | .3. |  |  |  | | --- | --- | | B. | .7. |  |  |  | | --- | --- | | C. | 1.4. |  |  |  | | --- | --- | | D. | 2.4. |  |  |  | | --- | --- | | E. | .8. | |

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| 80. | Daily capacity of a product layout is determined by:      |  |  | | --- | --- | | A. | cycle time divided by operating time. |  |  |  | | --- | --- | | B. | operating time divided by cycle time. |  |  |  | | --- | --- | | C. | operating time divided by total task time. |  |  |  | | --- | --- | | D. | total task time divided by cycle time. |  |  |  | | --- | --- | | E. | cycle time divided by total task time. | |

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| 81. | The maximum allowable cycle time is computed as:      |  |  | | --- | --- | | A. | daily operating time divided by the desired output. |  |  |  | | --- | --- | | B. | desired output divided by the daily operating time. |  |  |  | | --- | --- | | C. | daily operating time divided by the product of the desired output and the sum of job times. |  |  |  | | --- | --- | | D. | the product of desired output and the sum of job times divided by daily operating time. |  |  |  | | --- | --- | | E. | 1.00 minus station time. | |

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| 82. | If a line is balanced with 80 percent efficiency, the "balance delay" will be:      |  |  | | --- | --- | | A. | 20 percent. |  |  |  | | --- | --- | | B. | 80 percent. |  |  |  | | --- | --- | | C. | 100 percent. |  |  |  | | --- | --- | | D. | unknown, since balance delay is not related to efficiency. |  |  |  | | --- | --- | | E. | depends on the next operation. | |

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| 83. | The main issue in the design of process layouts for service operations concerns the relative positioning of:      |  |  | | --- | --- | | A. | workstations. |  |  |  | | --- | --- | | B. | processing components. |  |  |  | | --- | --- | | C. | departments. |  |  |  | | --- | --- | | D. | entrances, loading docks, etc. |  |  |  | | --- | --- | | E. | manufacturing cells. | |

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| 84. | Which of the following is not an information requirement for the design of a process layout?      |  |  | | --- | --- | | A. | a list of departments or work centers |  |  |  | | --- | --- | | B. | a projection of work flows between the work centers |  |  |  | | --- | --- | | C. | the distance between locations |  |  |  | | --- | --- | | D. | the cost per unit of distance to move loads |  |  |  | | --- | --- | | E. | a list of product cycle times for every product manufactured | |

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| 85. | Which of the following is not an approach that companies use to achieve a smooth flow of production?      |  |  | | --- | --- | | A. | line balancing heuristics |  |  |  | | --- | --- | | B. | parallel workstations |  |  |  | | --- | --- | | C. | dynamic line balancing (cross-training workers) |  |  |  | | --- | --- | | D. | mixed model line |  |  |  | | --- | --- | | E. | Companies use all of these. | |

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| 86. | A common goal in designing process layouts is:      |  |  | | --- | --- | | A. | minimizing the number of workers. |  |  |  | | --- | --- | | B. | minimizing idle time. |  |  |  | | --- | --- | | C. | minimizing transportation costs. |  |  |  | | --- | --- | | D. | maximizing workstation productive time. |  |  |  | | --- | --- | | E. | maximizing transportation distances. | |

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| 87. | In the use of closeness ratings for process layouts, the code U means the closeness between two departments is:      |  |  | | --- | --- | | A. | (U)nknown. |  |  |  | | --- | --- | | B. | (U)nusually important. |  |  |  | | --- | --- | | C. | of (U)sual importance. |  |  |  | | --- | --- | | D. | (U)nimportant. |  |  |  | | --- | --- | | E. | (U)ndesirable. | |

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| 88. | Which closeness rating reflects the undesirability of having two departments located near each other?      |  |  | | --- | --- | | A. | A |  |  |  | | --- | --- | | B. | E |  |  |  | | --- | --- | | C. | I |  |  |  | | --- | --- | | D. | U |  |  |  | | --- | --- | | E. | X | |

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| 89. | Which closeness rating reflects the highest importance for two departments being close to each other?      |  |  | | --- | --- | | A. | A |  |  |  | | --- | --- | | B. | E |  |  |  | | --- | --- | | C. | I |  |  |  | | --- | --- | | D. | U |  |  |  | | --- | --- | | E. | X | |

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| 90. | Which closeness rating reflects indifference on the nearness or lack of nearness of two departments?      |  |  | | --- | --- | | A. | A |  |  |  | | --- | --- | | B. | E |  |  |  | | --- | --- | | C. | I |  |  |  | | --- | --- | | D. | U |  |  |  | | --- | --- | | E. | X | |

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| 91. | Heuristic rules are used primarily in which of these types of layouts?  (I) Product (II) Process (III) Fixed-position      |  |  | | --- | --- | | A. | I |  |  |  | | --- | --- | | B. | II |  |  |  | | --- | --- | | C. | I and III |  |  |  | | --- | --- | | D. | I and II |  |  |  | | --- | --- | | E. | II and III | |

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| 92. | Heuristic rules are usually applied when:      |  |  | | --- | --- | | A. | an optimum is necessary. |  |  |  | | --- | --- | | B. | a computer program is unavailable. |  |  |  | | --- | --- | | C. | a problem has a small number of alternatives. |  |  |  | | --- | --- | | D. | a problem has a large number of alternatives. |  |  |  | | --- | --- | | E. | other approaches have failed. | |

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| 93. | An advantage of a U-shaped production line is that:      |  |  | | --- | --- | | A. | it is less compact. |  |  |  | | --- | --- | | B. | communication is reduced among employees. |  |  |  | | --- | --- | | C. | workers are specialists. |  |  |  | | --- | --- | | D. | work assignments are more rigid. |  |  |  | | --- | --- | | E. | it is more efficient than a traditional product layout. | |

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| 94. | Which of these items would be most likely to be made with a fixed-position layout?      |  |  | | --- | --- | | A. | a Boeing 777 jet aircraft |  |  |  | | --- | --- | | B. | applesauce |  |  |  | | --- | --- | | C. | a computer chip |  |  |  | | --- | --- | | D. | toothpaste |  |  |  | | --- | --- | | E. | all of these | |

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| 95. | A product-focused, single-piece flow, pull production system would be called a:      |  |  | | --- | --- | | A. | cellular layout. |  |  |  | | --- | --- | | B. | job shop. |  |  |  | | --- | --- | | C. | assembly line. |  |  |  | | --- | --- | | D. | nonrepetitive process. |  |  |  | | --- | --- | | E. | continuous flow. | |

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| 96. | Which one of these is a tool used to tell a machine the details of the operations to be performed?      |  |  | | --- | --- | | A. | CNC |  |  |  | | --- | --- | | B. | CIM |  |  |  | | --- | --- | | C. | CAD |  |  |  | | --- | --- | | D. | CAM |  |  |  | | --- | --- | | E. | automation | |

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| 97. | Which of the following is not a primary concern for process selection?      |  |  | | --- | --- | | A. | variety in products/services |  |  |  | | --- | --- | | B. | flexibility of equipment |  |  |  | | --- | --- | | C. | volume of output |  |  |  | | --- | --- | | D. | pricing strategy |  |  |  | | --- | --- | | E. | changeover costs | |

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| 98. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      Without regard to demand, what is the minimum possible cycle time (in seconds) for this situation?      |  |  | | --- | --- | | A. | 162 |  |  |  | | --- | --- | | B. | 72 |  |  |  | | --- | --- | | C. | 54 |  |  |  | | --- | --- | | D. | 12 |  |  |  | | --- | --- | | E. | 60 | |

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| 99. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      If the company wants the output rate to be equal to demand, what is the desired cycle time (in seconds)?      |  |  | | --- | --- | | A. | 162 |  |  |  | | --- | --- | | B. | 72 |  |  |  | | --- | --- | | C. | 54 |  |  |  | | --- | --- | | D. | 12 |  |  |  | | --- | --- | | E. | 60 | |

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| 100. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      If the company wants the output rate to be equal to demand, what is the minimum number of workstations needed?      |  |  | | --- | --- | | A. | 3 |  |  |  | | --- | --- | | B. | 4 |  |  |  | | --- | --- | | C. | 5 |  |  |  | | --- | --- | | D. | 6 |  |  |  | | --- | --- | | E. | 7 | |

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| 101. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      If the company wants the output rate to be equal to demand, what would be the efficiency of this line with the minimum number of workstations?      |  |  | | --- | --- | | A. | 100 percent |  |  |  | | --- | --- | | B. | 92.5 percent |  |  |  | | --- | --- | | C. | 75 percent |  |  |  | | --- | --- | | D. | 87.5 percent |  |  |  | | --- | --- | | E. | 90 percent | |

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| 102. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      If the company wants the output rate to be equal to demand, what is the last task performed at the second workstation in the balance which uses the minimum number of workstations?      |  |  | | --- | --- | | A. | u |  |  |  | | --- | --- | | B. | v |  |  |  | | --- | --- | | C. | w |  |  |  | | --- | --- | | D. | x |  |  |  | | --- | --- | | E. | y | |

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| 103. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      Without considering forecasted demand, what is the minimum possible cycle time for this production line?      |  |  | | --- | --- | | A. | 10 seconds |  |  |  | | --- | --- | | B. | 20 seconds |  |  |  | | --- | --- | | C. | 34 seconds |  |  |  | | --- | --- | | D. | 38 seconds |  |  |  | | --- | --- | | E. | 152 seconds | |

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| 104. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      For output to equal forecasted demand, what should be the actual cycle time for this production?      |  |  | | --- | --- | | A. | 32 seconds |  |  |  | | --- | --- | | B. | 38 seconds |  |  |  | | --- | --- | | C. | 40 seconds |  |  |  | | --- | --- | | D. | 76 seconds |  |  |  | | --- | --- | | E. | 152 seconds | |

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| 105. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      For output to equal forecasted demand, what is the minimum number of workstations needed?      |  |  | | --- | --- | | A. | 1 |  |  |  | | --- | --- | | B. | 3 |  |  |  | | --- | --- | | C. | 3.75 |  |  |  | | --- | --- | | D. | 4 |  |  |  | | --- | --- | | E. | 5 | |

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| 106. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      For output to equal forecasted demand, what will be the efficiency of the production line that uses the least number of workstations?      |  |  | | --- | --- | | A. | 81 percent |  |  |  | | --- | --- | | B. | 90 percent |  |  |  | | --- | --- | | C. | 95 percent |  |  |  | | --- | --- | | D. | 85 percent |  |  |  | | --- | --- | | E. | 100 percent | |

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| 107. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      For output to equal forecasted demand, what will be the second task performed at the second workstation of the production line that uses the fewest number of stations?      |  |  | | --- | --- | | A. | a |  |  |  | | --- | --- | | B. | b |  |  |  | | --- | --- | | C. | c |  |  |  | | --- | --- | | D. | d |  |  |  | | --- | --- | | E. | e | |

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| 108. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      Without considering projected demands, what is the minimum possible cycle time for this production line?      |  |  | | --- | --- | | A. | 54 seconds |  |  |  | | --- | --- | | B. | 14 seconds |  |  |  | | --- | --- | | C. | 12 seconds |  |  |  | | --- | --- | | D. | 10 seconds |  |  |  | | --- | --- | | E. | 4 seconds | |

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| 109. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      For output to equal projected demand, what should be the actual cycle time for this production line?      |  |  | | --- | --- | | A. | 54 seconds |  |  |  | | --- | --- | | B. | 27 seconds |  |  |  | | --- | --- | | C. | 20 seconds |  |  |  | | --- | --- | | D. | 18 seconds |  |  |  | | --- | --- | | E. | 14 seconds | |

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| 110. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      For output to equal projected demand, what is the minimum number of workstations needed?      |  |  | | --- | --- | | A. | 6 |  |  |  | | --- | --- | | B. | 4.5 |  |  |  | | --- | --- | | C. | 3 |  |  |  | | --- | --- | | D. | 2.7 |  |  |  | | --- | --- | | E. | 2 | |

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| 111. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      For output to equal projected demand, what will be the efficiency of the production line that uses the minimum number of workstations?      |  |  | | --- | --- | | A. | 93.33 percent |  |  |  | | --- | --- | | B. | 95 percent |  |  |  | | --- | --- | | C. | 97 percent |  |  |  | | --- | --- | | D. | 99 percent |  |  |  | | --- | --- | | E. | 100 percent | |

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| 112. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      For output to equal projected demand, what will be the first task performed at the third workstation of the production line which uses the minimum number of stations?      |  |  | | --- | --- | | A. | u |  |  |  | | --- | --- | | B. | v |  |  |  | | --- | --- | | C. | w |  |  |  | | --- | --- | | D. | x |  |  |  | | --- | --- | | E. | y | |

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| 113. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      Without regard to projected demand, what is the minimum possible cycle time for this assembly line?      |  |  | | --- | --- | | A. | 0 seconds |  |  |  | | --- | --- | | B. | 3 seconds |  |  |  | | --- | --- | | C. | 9 seconds |  |  |  | | --- | --- | | D. | 10 seconds |  |  |  | | --- | --- | | E. | 28 seconds | |

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| 114. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      For output to equal projected demand, what should be the actual cycle time for this assembly line?      |  |  | | --- | --- | | A. | 0 seconds |  |  |  | | --- | --- | | B. | 3 seconds |  |  |  | | --- | --- | | C. | 9 seconds |  |  |  | | --- | --- | | D. | 10 seconds |  |  |  | | --- | --- | | E. | 28 seconds | |

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| 115. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      For output to equal projected demand, what is the minimum number of workstations needed?      |  |  | | --- | --- | | A. | 2 |  |  |  | | --- | --- | | B. | 2.8 |  |  |  | | --- | --- | | C. | 3 |  |  |  | | --- | --- | | D. | 4 |  |  |  | | --- | --- | | E. | 5 | |

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| 116. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      For output to equal projected demand, what will be the efficiency of the assembly line that uses the minimum number of workstations?      |  |  | | --- | --- | | A. | 0.0 percent |  |  |  | | --- | --- | | B. | 6.7 percent |  |  |  | | --- | --- | | C. | 70.0 percent |  |  |  | | --- | --- | | D. | 93.3 percent |  |  |  | | --- | --- | | E. | 100 percent | |

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| 117. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      For output to equal projected demand, what will be the idle time at the second workstation of the assembly line that uses the minimum number of workstations?      |  |  | | --- | --- | | A. | 0 seconds |  |  |  | | --- | --- | | B. | 1 second |  |  |  | | --- | --- | | C. | 2 seconds |  |  |  | | --- | --- | | D. | 3 seconds |  |  |  | | --- | --- | | E. | 5 seconds | |

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| 118. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      What is the distance (in meters) from area III to area I in this new facility?      |  |  | | --- | --- | | A. | 0 |  |  |  | | --- | --- | | B. | 10 |  |  |  | | --- | --- | | C. | 20 |  |  |  | | --- | --- | | D. | 30 |  |  |  | | --- | --- | | E. | 40 | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 119. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      What is the total flow (loads per week) between department Y and department Z?      |  |  | | --- | --- | | A. | 140 |  |  |  | | --- | --- | | B. | 160 |  |  |  | | --- | --- | | C. | 200 |  |  |  | | --- | --- | | D. | 250 |  |  |  | | --- | --- | | E. | 300 | |

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| 120. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      If departments X, Y, and Z were to be located in areas I, II, and III, respectively, what would be the total distance (in meters) loads would be moved each week?      |  |  | | --- | --- | | A. | 4,000 |  |  |  | | --- | --- | | B. | 4,500 |  |  |  | | --- | --- | | C. | 7,000 |  |  |  | | --- | --- | | D. | 8,000 |  |  |  | | --- | --- | | E. | 9,000 | |

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| 121. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      What are total weekly costs for the least costly process layout?      |  |  | | --- | --- | | A. | $2,800 |  |  |  | | --- | --- | | B. | $3,150 |  |  |  | | --- | --- | | C. | $3,500 |  |  |  | | --- | --- | | D. | $4,000 |  |  |  | | --- | --- | | E. | $4,500 | |

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| 122. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      How many least costly process layouts are there?      |  |  | | --- | --- | | A. | 1 |  |  |  | | --- | --- | | B. | 2 |  |  |  | | --- | --- | | C. | 3 |  |  |  | | --- | --- | | D. | 4 |  |  |  | | --- | --- | | E. | 5 | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 123. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      What is the distance (in meters) from area III to area I of this new facility?      |  |  | | --- | --- | | A. | 0 |  |  |  | | --- | --- | | B. | 10 |  |  |  | | --- | --- | | C. | 20 |  |  |  | | --- | --- | | D. | 30 |  |  |  | | --- | --- | | E. | 40 | |

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| 124. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      What is the total flow (loads per week) between department Y and department Z?      |  |  | | --- | --- | | A. | 130 |  |  |  | | --- | --- | | B. | 150 |  |  |  | | --- | --- | | C. | 180 |  |  |  | | --- | --- | | D. | 230 |  |  |  | | --- | --- | | E. | 280 | |

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| 125. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      If the company were to locate departments X, Y, and Z in areas 1, 2, and 3, respectively, what would be the total distance (in meters) loads would be moved each week?      |  |  | | --- | --- | | A. | 3,100 |  |  |  | | --- | --- | | B. | 3,600 |  |  |  | | --- | --- | | C. | 6,200 |  |  |  | | --- | --- | | D. | 6,700 |  |  |  | | --- | --- | | E. | 8,200 | |

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| 126. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      What is the layout that will minimize the total distance loads will be moved each week?      |  |  | | --- | --- | | A. | X in 1; Y in 2; Z in 3 |  |  |  | | --- | --- | | B. | X in 1; Z in 2; Y in 3 |  |  |  | | --- | --- | | C. | Y in 1; X in 2; Z in 3 |  |  |  | | --- | --- | | D. | Z in 1; X in 2; Y in 3 |  |  |  | | --- | --- | | E. | Z in 1; Y in 2; X in 3 | |

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| 127. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      What are total weekly costs for an optimum layout?      |  |  | | --- | --- | | A. | $2,600 |  |  |  | | --- | --- | | B. | $3,600 |  |  |  | | --- | --- | | C. | $6,200 |  |  |  | | --- | --- | | D. | $7,200 |  |  |  | | --- | --- | | E. | $8,200 | |

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| 128. | Which of the following process types would be most likely to be used in the introductory phase of a product's life cycle?      |  |  | | --- | --- | | A. | continuous |  |  |  | | --- | --- | | B. | intermittent |  |  |  | | --- | --- | | C. | project |  |  |  | | --- | --- | | D. | batch |  |  |  | | --- | --- | | E. | job shop | |

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| 129. | Which of the following process types would be most likely to be used in the maturity phase of a product's life cycle?      |  |  | | --- | --- | | A. | repetitive |  |  |  | | --- | --- | | B. | intermittent |  |  |  | | --- | --- | | C. | project |  |  |  | | --- | --- | | D. | batch |  |  |  | | --- | --- | | E. | job shop | |

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| 130. | What is it about job shops that make them appropriate for products in the introductory phase of their life cycle?      |  |  | | --- | --- | | A. | efficiency |  |  |  | | --- | --- | | B. | technology |  |  |  | | --- | --- | | C. | flexibility |  |  |  | | --- | --- | | D. | high volume capacity |  |  |  | | --- | --- | | E. | rigidity | |

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| 131. | What is it about repetitive processes that make them appropriate for products in the maturity phase of their life cycle?      |  |  | | --- | --- | | A. | efficiency |  |  |  | | --- | --- | | B. | general-purpose technology |  |  |  | | --- | --- | | C. | possible variety |  |  |  | | --- | --- | | D. | low risk |  |  |  | | --- | --- | | E. | flexibility | |

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| 132. | Although they do not guarantee optimal solutions, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are useful in finding reasonable solutions when the number of possible options is overwhelming.      |  |  | | --- | --- | | A. | cellular layouts |  |  |  | | --- | --- | | B. | heuristics |  |  |  | | --- | --- | | C. | logistics |  |  |  | | --- | --- | | D. | CAM |  |  |  | | --- | --- | | E. | CAD | |

**Essay Questions**

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| 133. | Management wants to design an assembly line that will turn out 800 videotapes per day. There will be eight working hours in each day. The industrial engineering staff has assembled the information below:      A) Determine the maximum and minimum cycle times. B) Determine the optimum cycle time. C) What is the minimum number of stations needed? D) Draw the precedence diagram. E) Assign tasks to stations in order of most following tasks first. |

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| 134. | Given the information below, assign departments to locations in a 3 x 3 grid, with department F in the lower right-hand corner. |

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| 135. | Given the information below, assign the departments A through I to locations in a 3 x 3 grid, with department E fixed in the lower right-hand corner. |

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| 136. | Determine the minimum number of workstations needed for this situation:  Operating time is 450 minutes per day. Desired output is 80 units per day. The sum of task times is 56 minutes. |

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| 137. | Given the following data:      Determine the percentage idle time. |

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| 138. | Given the following process layout data for locating six departments in the six areas shown:      What process layout(s) satisfy(ies) these closeness ratings? |

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| 139. | Given the following line balance data:      What is the minimum possible cycle time? |

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| 140. | Given the following line balance data:      What is the maximum possible cycle time? |

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| 141. | Given the following line balance data:      What is the appropriate cycle time for eight hours of operating time per day and a desired output rate of 960 units per day? |

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| 142. | Given the following line balance data:      For eight hours of operating time per day and a desired output rate of 960 units per day, what is the minimum number of stations needed to achieve the appropriate cycle time? |

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| 143. | Given the following line balance data:      For eight hours of operating time per day and a desired output rate of 960 units per day, what balance (if any) will yield the minimum number of stations? |

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| 144. | Given the following line balance data:      For eight hours of operating time per day and a desired output rate of 960 units per day, what is the percentage of idle time for the balance which uses the minimum number of stations? |

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| 145. | Given the following line balance data:      For eight hours of operating time per day and a desired output rate of 960 units per day, what is the efficiency for the balance which uses the minimum number of stations? |

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| 146. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      What is the distance from area 3 to area 1? |

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| 147. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      What is the total flow between departments B and D? |

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| 148. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      If departments A through D were to be located in areas 1 through 4, respectively, what would be the total distance loads would be moved each month? |

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| 149. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      If department C must be located in area 1, what layout will minimize the total distance loads will be moved each month? |

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| 150. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      If transportation costs are $.25 per load per foot moved, what are total monthly costs for an optimum layout? |

Chapter 06 Process Selection and Facility Layout Answer Key

**True / False Questions**

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| 1. | Continuous processing is the best way to produce customized output.    **FALSE**  Continuous processing is best for standardized output. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-01 Explain the strategic importance of process selection and the influence it has on the organization and its supply chain. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 2. | As a general rule, continuous processing systems produce products for inventory rather than for customer order.    **TRUE**  Continuous processing systems tend to be used in make-to-stock scenarios. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 3. | A job-shop processing system generally requires less-skilled workers than a continuous processing system.    **FALSE**  Job shops require greater skill on the part of their workers. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 4. | Avoiding bottlenecks is the primary goal of product design.    **FALSE**  Avoiding bottlenecks is a primary consideration in facilities layout. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-05 List some reasons for redesign of layouts. Level of Difficulty: 1 Easy Topic: Process Strategy* |

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| 5. | In general, job-shop systems have a lower unit cost than continuous systems do because continuous systems use costly specialized equipment.    **FALSE**  Specialized equipment can lead to lower unit cost. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 3 Hard Topic: Process Selection* |

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| 6. | Continuous production has been a significant factor underpinning the U.S. standard of living over the last century.    **TRUE**  Continuous production has led to substantial productivity gains. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 7. | Right-sized equipment tends to be larger than equipment used in traditional process layouts.    **FALSE**  Right-sizing can lead to smaller equipment. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 8. | Intermittent processing can take the form of batch processing or a job shop.    **TRUE**  A job shop is a batch processer with a standard batch size of one. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 9. | The term "computer-aided manufacturing" refers primarily to the use of robotics in process control.    **FALSE**  CAM involves using computer technology to control various facets of the manufacturing process. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Technology* |

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| 10. | Flexible manufacturing systems bring the benefits of automation to continuous processes.    **FALSE**  FMS can bring the benefits of flexibility to continuous processes. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 3 Hard Topic: Technology* |

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| 11. | Repetitive processing systems usually produce goods specifically for customer orders rather than for inventory.    **FALSE**  Repetitive processing systems usually produce goods for inventory. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 12. | Morale problems can be a reason for redesign of a facility layout.    **TRUE**  A layout redesign can lead to improved morale. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-05 List some reasons for redesign of layouts. Level of Difficulty: 1 Easy Topic: Strategic Resource Organization: Facilities Layout* |

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| 13. | There are three basic process types: input, processing, and output.    **FALSE**  There are five basic process types: job shop, batch, repetitive, continuous, and project. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 14. | A cafeteria line would be an example of a process-focused layout.    **FALSE**  This would be an example of a product-focused layout. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-07 Describe process layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 15. | A possible disadvantage of a product layout is an inflexible system.    **TRUE**  Product layouts are inherently inflexible. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 1 Easy Topic: Strategic Resource Organization: Facilities Layout* |

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| 16. | Product layouts involve high utilization of labor and equipment.    **TRUE**  They're used in high volume, standardized operations. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 17. | A manufacturing cell allows the production of a wide range of very different products.    **FALSE**  A cell is for a modest variety of output within a product family. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 18. | Product layouts can more easily adapt to variations in product requirements than process layouts can.    **FALSE**  Process layouts are more adaptable. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 1 Easy Topic: Strategic Resource Organization: Facilities Layout* |

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| 19. | Process layouts feature departments or other functional groupings of personnel or equipment.    **TRUE**  Departmental or functional grouping is an example of process layout. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-07 Describe process layouts and their main advantages and disadvantages. Level of Difficulty: 1 Easy Topic: Strategic Resource Organization: Facilities Layout* |

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| 20. | Information technology refers to competitive data.    **FALSE**  Information technology refers to both data and systems. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Technology* |

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| 21. | A process layout is more susceptible to shutdowns caused by equipment breakdowns than a product layout.    **FALSE**  A product layout is more susceptible to these. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-07 Describe process layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 22. | Accounting, purchasing, and inventory control are fairly routine with process layouts.    **FALSE**  They are more routine in product layouts. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-07 Describe process layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 23. | A disadvantage of a product layout can be high in-process inventory costs.    **FALSE**  In-process inventory is low with a product layout. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 3 Hard Topic: Strategic Resource Organization: Facilities Layout* |

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| 24. | In cellular manufacturing, machines and equipment are grouped by type (e.g., all grinders are grouped into a cell).    **FALSE**  In cellular layouts, machines and equipment are grouped by the needs of the product family. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 3 Hard Topic: Strategic Resource Organization: Facilities Layout* |

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| 25. | Among the benefits claimed for cellular manufacturing are less material handling and reduced setup time.    **TRUE**  These are lower in cellular manufacturing. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 26. | Group technology is closely connected to cellular manufacturing.    **TRUE**  Both require a systematic analysis of parts to identify the part families. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 27. | The percentage of idle time in an assembly line is called cycle time.    **FALSE**  This is called balance delay. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 28. | Mismatches between operational capabilities and market demand can have a negative impact on an organization.    **TRUE**  These can lead to changes in processes. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-01 Explain the strategic importance of process selection and the influence it has on the organization and its supply chain. Level of Difficulty: 2 Medium Topic: Process Strategy* |

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| 29. | Service layouts must be visually pleasing as well as functional.    **TRUE**  The service layout is often perceived by the customer. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 30. | "Balance delay" is another name for the percentage of idle time in a product layout.    **TRUE**  Greater utilization implies a smaller balance delay. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 1 Easy Topic: Designing Product Layouts: Line Balancing* |

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| 31. | "Balance delay" is another name for the percentage of idle time in a process layout.    **FALSE**  Balance delay is applicable in product layouts. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 32. | For a production line, daily capacity can be determined by dividing the daily operating time by the line's cycle time.    **TRUE**  The line's cycle time represents the time between units. Thus, dividing the time available by the cycle time gives the daily capacity. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 33. | The minimum number of workstations for a production line is determined in part by the desired output rate.    **TRUE**  The desired output rate is used to find the required cycle time. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 1 Easy Topic: Designing Product Layouts: Line Balancing* |

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| 34. | The goal of line balancing is to assign tasks to workstations in such a way that the workstations have approximately equal time requirements.    **TRUE**  This is why it is called line balancing. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 35. | An idle percentage of zero means a line is perfectly balanced.    **TRUE**  All workstations would be occupied 100 percent of the time. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 36. | None of the approaches to line balancing, manual or computerized, guarantees an optimal solution.    **TRUE**  Optimal solutions cannot be guaranteed through the use of heuristics. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 37. | Heuristic approaches to line balancing are the only approach that will guarantee an optimal solution.    **FALSE**  Heuristic approaches cannot guarantee an optimal solution. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 38. | The main issue in the design of process layouts concerns the relative positioning of the departments involved.    **TRUE**  Designing process layouts involves the relative positioning of the departments involved. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-07 Describe process layouts and their main advantages and disadvantages. Level of Difficulty: 1 Easy Topic: Designing Process Layouts* |

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| 39. | An advantage of a U-shaped production line is that it facilitates teamwork and flexibility in work assignments.    **TRUE**  These are key factors in favor of U-shaped layouts. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 1 Easy Topic: Strategic Resource Organization: Facilities Layout* |

**Multiple Choice Questions**

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| 40. | Key aspects of the process selection challenge include \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | information technology; marketing strategy |  |  |  | | --- | --- | | B. | process flexibility; marketing strategy |  |  |  | | --- | --- | | **C.** | capital intensity; process flexibility |  |  |  | | --- | --- | | D. | marketing strategy; operations strategy |  |  |  | | --- | --- | | E. | capacity planning; marketing strategy |   Key aspects of the process selection challenge include capital intensity and process flexibility. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-01 Explain the strategic importance of process selection and the influence it has on the organization and its supply chain. Level of Difficulty: 2 Medium Topic: Process Selection and Facility Layout* |

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| 41. | When new products or services are being planned, process selection occurs as a matter of course. Process selection also comes into play as a result of:  (I) technological changes. (II) competitive pressures. (III) fundamental changes in demand patterns.      |  |  | | --- | --- | | A. | I only |  |  |  | | --- | --- | | B. | II only |  |  |  | | --- | --- | | C. | III only |  |  |  | | --- | --- | | D. | I and II but not III |  |  |  | | --- | --- | | **E.** | I, II, and III |   All of these could lead to a reconfiguration of fundamental processes. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-01 Explain the strategic importance of process selection and the influence it has on the organization and its supply chain. Level of Difficulty: 2 Medium Topic: Process Selection and Facility Layout* |

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| 42. | Process choice is \_\_\_\_\_\_\_\_\_ driven.      |  |  | | --- | --- | | **A.** | demand |  |  |  | | --- | --- | | B. | operations |  |  |  | | --- | --- | | C. | marketing |  |  |  | | --- | --- | | D. | process |  |  |  | | --- | --- | | E. | capacity |   Process choice is demand driven. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-02 Name the two main factors that influence process selection. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 43. | The key questions in the process selection task are:  (I) How will the product/service be priced? (II) How much variety will be imposed on the process? (III) What is the target market for the product/service? (IV) At what volume will the process need to operate?      |  |  | | --- | --- | | A. | I and III |  |  |  | | --- | --- | | **B.** | II and IV |  |  |  | | --- | --- | | C. | II and III |  |  |  | | --- | --- | | D. | I and IV |  |  |  | | --- | --- | | E. | III and IV |   The two key questions in process selection are: (1) How much variety will the process need to be able to handle? and (2) How much volume will the process need to be able to handle? |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-02 Name the two main factors that influence process selection. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 44. | Job shops tend to be \_\_\_\_\_\_\_\_\_\_ while continuous processes tend to be \_\_\_\_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | in services; in manufacturing |  |  |  | | --- | --- | | B. | short-term and capital intensive; long-term and labor intensive |  |  |  | | --- | --- | | **C.** | small scale and flexible; large-scale and inflexible |  |  |  | | --- | --- | | D. | standardized; customized |  |  |  | | --- | --- | | E. | low cost-per-unit; high cost-per-unit |   Job shops tend to be much smaller and more flexible than continuous processes. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-02 Name the two main factors that influence process selection. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 45. | The estimation of costs is generally most difficult when the \_\_\_\_\_\_\_\_\_\_\_ process has been chosen.      |  |  | | --- | --- | | A. | project |  |  |  | | --- | --- | | B. | repetitive |  |  |  | | --- | --- | | C. | continuous |  |  |  | | --- | --- | | D. | batch |  |  |  | | --- | --- | | **E.** | job shop |   Cost estimation is very difficult in job shops. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-02 Name the two main factors that influence process selection. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 46. | In an environment in which demand is both substantial and stable, \_\_\_\_\_\_\_\_\_\_ technology tends to be the best choice.      |  |  | | --- | --- | | A. | batch production |  |  |  | | --- | --- | | **B.** | fixed automation |  |  |  | | --- | --- | | C. | project production |  |  |  | | --- | --- | | D. | programmable automation |  |  |  | | --- | --- | | E. | flexible automation |   Fixed automation is the least flexible, but low cost and high volume are its primary advantages. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Process Selection and Facility Layout* |

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| 47. | Computer-integrated manufacturing integrates \_\_\_\_\_\_\_\_\_\_\_\_\_\_ with manufacturing.      |  |  | | --- | --- | | **A.** | information from across the organization |  |  |  | | --- | --- | | B. | demand forecasts |  |  |  | | --- | --- | | C. | marketing strategy |  |  |  | | --- | --- | | D. | human resources |  |  |  | | --- | --- | | E. | inventory levels |   A CIM system integrates information from other areas of an organization with manufacturing. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Process Selection and Facility Layout* |

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| 48. | Which of the following is not a process commonly considered in making products or delivering services?      |  |  | | --- | --- | | A. | continuous |  |  |  | | --- | --- | | B. | batch |  |  |  | | --- | --- | | C. | repetitive |  |  |  | | --- | --- | | D. | job shop |  |  |  | | --- | --- | | **E.** | subcontracting |   Subcontracting isn't a process type. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 49. | The type of processing system which is used for highly standardized products is:      |  |  | | --- | --- | | **A.** | continuous. |  |  |  | | --- | --- | | B. | intermittent. |  |  |  | | --- | --- | | C. | project. |  |  |  | | --- | --- | | D. | batch. |  |  |  | | --- | --- | | E. | unit. |   Continuous processing is for highly standardized products. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 50. | Cellular layout is a term associated with:      |  |  | | --- | --- | | A. | wireless telecommunication. |  |  |  | | --- | --- | | **B.** | part families. |  |  |  | | --- | --- | | C. | functional (or process) layouts. |  |  |  | | --- | --- | | D. | assembly lines. |  |  |  | | --- | --- | | E. | job shops. |   Part families are produced on cells. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 3 Hard Topic: Strategic Resource Organization: Facilities Layout* |

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| 51. | The substitution of machinery that has sensing and control devices for human labor is best described by the term:      |  |  | | --- | --- | | **A.** | automation. |  |  |  | | --- | --- | | B. | feedback control. |  |  |  | | --- | --- | | C. | computer-aided manufacturing. |  |  |  | | --- | --- | | D. | computer-integrated manufacturing. |  |  |  | | --- | --- | | E. | flexible manufacturing system. |   Automation involves the substitution of machinery that has sensing and control devices for human labor. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Technology* |

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| 52. | Computer-aided manufacturing refers to the use of computers in:      |  |  | | --- | --- | | A. | product design. |  |  |  | | --- | --- | | B. | decision making. |  |  |  | | --- | --- | | C. | data analysis. |  |  |  | | --- | --- | | D. | quality control. |  |  |  | | --- | --- | | **E.** | process control. |   CAM automates process control. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Technology* |

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| 53. | A group of machines including supervisory computer control, automatic material handling, and possibly robots is called:      |  |  | | --- | --- | | A. | computer-aided design. |  |  |  | | --- | --- | | B. | a manufacturing cell. |  |  |  | | --- | --- | | C. | computer-aided manufacturing. |  |  |  | | --- | --- | | D. | computer-integrated manufacturing. |  |  |  | | --- | --- | | **E.** | a flexible manufacturing system. |   FMS involve all these things. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 3 Hard Topic: Technology* |

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| 54. | In which type of operation are you likely to see, at most, only minor variations in the product or service being produced using the same process and the same equipment?      |  |  | | --- | --- | | A. | a project |  |  |  | | --- | --- | | B. | a job shop |  |  |  | | --- | --- | | **C.** | repetitive production |  |  |  | | --- | --- | | D. | batch processing |  |  |  | | --- | --- | | E. | intermittent production |   In continuous production there is no variation in the product or service being produced. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 55. | The process of assigning tasks to workstations in such a way that the workstations have approximately equal time requirements is called:      |  |  | | --- | --- | | A. | fair employment practices. |  |  |  | | --- | --- | | B. | idle time analysis. |  |  |  | | --- | --- | | **C.** | line balancing. |  |  |  | | --- | --- | | D. | cycle time optimization. |  |  |  | | --- | --- | | E. | capacity cycling. |   The goal is to reasonably balance work across the workstations. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 56. | An operations strategy for process selection should recognize that:      |  |  | | --- | --- | | A. | process selection seldom requires technical expertise. |  |  |  | | --- | --- | | B. | engineering "white elephants" are uncommon. |  |  |  | | --- | --- | | C. | there is little need to manage technology. |  |  |  | | --- | --- | | **D.** | flexibility is not always the best choice. |  |  |  | | --- | --- | | E. | most technical skills can be contracted out to consultants. |   Flexibility isn't so valuable if efficiency is at a premium. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-01 Explain the strategic importance of process selection and the influence it has on the organization and its supply chain. Level of Difficulty: 2 Medium Topic: Process Strategy* |

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| 57. | Layout planning is required because of:  (I) efficient operations. (II) accidents or safety hazards. (III) new products or services. (IV) morale problems.      |  |  | | --- | --- | | A. | I and II |  |  |  | | --- | --- | | B. | II and IV |  |  |  | | --- | --- | | C. | I and III |  |  |  | | --- | --- | | **D.** | II, III, and IV |  |  |  | | --- | --- | | E. | I, II, III, and IV |   A number of factors affect layout planning. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-05 List some reasons for redesign of layouts. Level of Difficulty: 3 Hard Topic: Strategic Resource Organization: Facilities Layout* |

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| 58. | The advantages of automation include:  (I) reduced output variability. (II) reduced variable costs. (III) machines don't strike or file grievances. (IV) machines are always less expensive than human labor.      |  |  | | --- | --- | | A. | I and IV |  |  |  | | --- | --- | | B. | II and III |  |  |  | | --- | --- | | **C.** | I, II, and III |  |  |  | | --- | --- | | D. | I and III |  |  |  | | --- | --- | | E. | II and IV |   Machines can be more expensive than human labor. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Technology* |

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| 59. | As compared to rigid automation, the benefits of flexible manufacturing systems include:      |  |  | | --- | --- | | A. | reduced labor requirements. |  |  |  | | --- | --- | | B. | higher efficiency. |  |  |  | | --- | --- | | C. | larger batch sizes. |  |  |  | | --- | --- | | **D.** | significantly lower fixed costs. |  |  |  | | --- | --- | | E. | significantly lower variable costs. |   Reduced labor costs and consistent quality and quick changeover time provide lower unit costs. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Technology* |

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| 60. | Which type of processing system tends to produce the most product variety?      |  |  | | --- | --- | | A. | assembly |  |  |  | | --- | --- | | **B.** | job shop |  |  |  | | --- | --- | | C. | batch |  |  |  | | --- | --- | | D. | continuous |  |  |  | | --- | --- | | E. | project |   A job shop provides low volume of high-variety goods. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 2 Medium Topic: Process Selection* |

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| 61. | In which type of processing system would gasoline be produced from crude oil?      |  |  | | --- | --- | | A. | job shop |  |  |  | | --- | --- | | B. | batch |  |  |  | | --- | --- | | C. | assembly |  |  |  | | --- | --- | | **D.** | continuous |  |  |  | | --- | --- | | E. | project |   Oil refining is an example of a continuous process. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 62. | Which of the following is not a characteristic of layout decisions in system design?      |  |  | | --- | --- | | A. | substantial investment of both money and effort |  |  |  | | --- | --- | | B. | long-term commitment |  |  |  | | --- | --- | | C. | significant impact on short-term efficiency |  |  |  | | --- | --- | | **D.** | usually well received by operative personnel |  |  |  | | --- | --- | | E. | can affect supplier or customer processes |   Layout decisions can lead to conflict from those who are affected by them. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-05 List some reasons for redesign of layouts. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 63. | An example of automated services is:      |  |  | | --- | --- | | **A.** | online banking. |  |  |  | | --- | --- | | B. | build your own pizza. |  |  |  | | --- | --- | | C. | haircuts. |  |  |  | | --- | --- | | D. | massage parlors. |  |  |  | | --- | --- | | E. | financial advising. |   Online banking has almost no human-to-human interaction. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 1 Easy Topic: Technology* |

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| 64. | Which one of the following is not common to product layouts?      |  |  | | --- | --- | | A. | a high rate of output |  |  |  | | --- | --- | | B. | specialization of labor |  |  |  | | --- | --- | | C. | low unit costs |  |  |  | | --- | --- | | **D.** | ability to adjust to changes in demand |  |  |  | | --- | --- | | E. | special-purpose technology |   Product layouts are not flexible with respect to volume. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 1 Easy Topic: Strategic Resource Organization: Facilities Layout* |

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| 65. | Which one of the following is not considered an important factor in service layout design?      |  |  | | --- | --- | | **A.** | cost minimization and product flow |  |  |  | | --- | --- | | B. | frequency of orders |  |  |  | | --- | --- | | C. | customer attitude and image |  |  |  | | --- | --- | | D. | intensity of contact with the customer |  |  |  | | --- | --- | | E. | customer preferences with regard to variety |   Service layout design is generally not all that focused on cost minimization. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 66. | The type of layout which features departments or other functional groupings in which similar activities are performed is:      |  |  | | --- | --- | | **A.** | process. |  |  |  | | --- | --- | | B. | product. |  |  |  | | --- | --- | | C. | fixed-position. |  |  |  | | --- | --- | | D. | mass. |  |  |  | | --- | --- | | E. | unit. |   Process layouts group similar activities. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-07 Describe process layouts and their main advantages and disadvantages. Level of Difficulty: 1 Easy Topic: Strategic Resource Organization: Facilities Layout* |

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| 67. | Which of the following is not true about process layouts when they are compared to product layouts?      |  |  | | --- | --- | | A. | higher in-process inventories |  |  |  | | --- | --- | | B. | lower span of supervision |  |  |  | | --- | --- | | C. | lower rates of output |  |  |  | | --- | --- | | D. | more involved cost accounting |  |  |  | | --- | --- | | **E.** | lower unit costs |   Process layouts are not inherently more efficient that product layouts. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Understand Learning Objective: 06-07 Describe process layouts and their main advantages and disadvantages. Level of Difficulty: 3 Hard Topic: Strategic Resource Organization: Facilities Layout* |

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| 68. | The type of layout in which workers, materials, and equipment are moved to the product as needed is:      |  |  | | --- | --- | | A. | process. |  |  |  | | --- | --- | | B. | product. |  |  |  | | --- | --- | | **C.** | fixed-position. |  |  |  | | --- | --- | | D. | batch. |  |  |  | | --- | --- | | E. | mass. |   The fixed-position layout brings the processes to the product. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 1 Easy Topic: Strategic Resource Organization: Facilities Layout* |

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| 69. | The grouping of equipment by the operations needed to perform similar work for part families is:      |  |  | | --- | --- | | A. | product layout. |  |  |  | | --- | --- | | **B.** | cellular manufacturing layout. |  |  |  | | --- | --- | | C. | functional layout. |  |  |  | | --- | --- | | D. | fixed-position layout. |  |  |  | | --- | --- | | E. | process layout. |   Cellular layouts are organized around part families. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 70. | Which term is most closely associated with cellular manufacturing?      |  |  | | --- | --- | | **A.** | part families |  |  |  | | --- | --- | | B. | assembly line |  |  |  | | --- | --- | | C. | robotics |  |  |  | | --- | --- | | D. | CAD |  |  |  | | --- | --- | | E. | CAM |   Part families are central to cellular manufacturing. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 71. | Laser technology used in surgical procedures is an example of technological advances in:      |  |  | | --- | --- | | A. | product. |  |  |  | | --- | --- | | B. | facility layout. |  |  |  | | --- | --- | | **C.** | process. |  |  |  | | --- | --- | | D. | information. |  |  |  | | --- | --- | | E. | reverse engineering. |   Laser technology represents a change in the fundamental surgical process. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Technology* |

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| 72. | Product profiling links key product or service requirements to:      |  |  | | --- | --- | | A. | market conditions. |  |  |  | | --- | --- | | B. | order sizes. |  |  |  | | --- | --- | | C. | pricing strategies. |  |  |  | | --- | --- | | D. | schedule changes. |  |  |  | | --- | --- | | **E.** | process capabilities. |   Product profiling allows firms to match what they should (or must) do with respect to product or service requirements. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-01 Explain the strategic importance of process selection and the influence it has on the organization and its supply chain. Level of Difficulty: 3 Hard Topic: Process Strategy* |

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| 73. | Layout design has many objectives, one of which is:      |  |  | | --- | --- | | A. | reduce bottlenecks. |  |  |  | | --- | --- | | B. | move materials and workers simultaneously. |  |  |  | | --- | --- | | **C.** | use workers and space efficiently. |  |  |  | | --- | --- | | D. | hold material handling costs to 27 percent or less. |  |  |  | | --- | --- | | E. | install computer terminals every 500 feet. |   Layout design is focused on the efficient placement of human and other assets. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-05 List some reasons for redesign of layouts. Level of Difficulty: 3 Hard Topic: Strategic Resource Organization: Facilities Layout* |

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| 74. | Which phrase most closely describes flexible manufacturing systems?      |  |  | | --- | --- | | A. | a variation of CAD |  |  |  | | --- | --- | | **B.** | a more fully automated version of cellular manufacturing |  |  |  | | --- | --- | | C. | manufacturing resource planning |  |  |  | | --- | --- | | D. | a process layout with a manufacturing overlay |  |  |  | | --- | --- | | E. | an approach that allows workers to begin work at a time of their choosing |   Flexible automation allows for greater variety within or across product families. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 2 Medium Topic: Technology* |

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| 75. | A service organization (for example, a hospital) is likely to use a(n) \_\_\_\_\_\_\_\_ layout because of variability in customer processing requirements.      |  |  | | --- | --- | | A. | project |  |  |  | | --- | --- | | **B.** | process |  |  |  | | --- | --- | | C. | flow |  |  |  | | --- | --- | | D. | assembly |  |  |  | | --- | --- | | E. | nonrepetitive |   A process layout is capable of providing more variety. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-07 Describe process layouts and their main advantages and disadvantages. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 76. | In a product layout, the task of deciding how to assign work to specific stations is referred to as:      |  |  | | --- | --- | | A. | process balancing. |  |  |  | | --- | --- | | B. | task allocation. |  |  |  | | --- | --- | | **C.** | line balancing. |  |  |  | | --- | --- | | D. | work allocation. |  |  |  | | --- | --- | | E. | station balancing. |   Line balancing allocates work to workstations. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 1 Easy Topic: Designing Product Layouts: Line Balancing* |

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| 77. | The minimum possible cycle time in a product layout is determined by the:      |  |  | | --- | --- | | **A.** | longest task time. |  |  |  | | --- | --- | | B. | shortest task time. |  |  |  | | --- | --- | | C. | average task time. |  |  |  | | --- | --- | | D. | total task time. |  |  |  | | --- | --- | | E. | per-unit setup time. |   The longest task time represents the minimum cycle time. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 78. | A production line is to be designed for a job with three tasks. The task times are .4 minutes, 1.2 minutes, and .5 minutes. The maximum cycle time in minutes is:      |  |  | | --- | --- | | A. | .3. |  |  |  | | --- | --- | | B. | .7. |  |  |  | | --- | --- | | C. | 1.4. |  |  |  | | --- | --- | | **D.** | 2.1. |  |  |  | | --- | --- | | E. | .8. |   This assumes only one workstation. |

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| *AACSB: Analytic Accessibility: Keyboard Navigation Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 79. | A production line is to be designed for a job with three tasks. The task times are .3 minutes, 1.4 minutes, and .7 minutes. The minimum cycle time in minutes is:      |  |  | | --- | --- | | A. | .3. |  |  |  | | --- | --- | | B. | .7. |  |  |  | | --- | --- | | **C.** | 1.4. |  |  |  | | --- | --- | | D. | 2.4. |  |  |  | | --- | --- | | E. | .8. |   The longest task time equals the minimum cycle time. |

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| *AACSB: Analytic Accessibility: Keyboard Navigation Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 80. | Daily capacity of a product layout is determined by:      |  |  | | --- | --- | | A. | cycle time divided by operating time. |  |  |  | | --- | --- | | **B.** | operating time divided by cycle time. |  |  |  | | --- | --- | | C. | operating time divided by total task time. |  |  |  | | --- | --- | | D. | total task time divided by cycle time. |  |  |  | | --- | --- | | E. | cycle time divided by total task time. |   This represents how many units are possible per day. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 81. | The maximum allowable cycle time is computed as:      |  |  | | --- | --- | | **A.** | daily operating time divided by the desired output. |  |  |  | | --- | --- | | B. | desired output divided by the daily operating time. |  |  |  | | --- | --- | | C. | daily operating time divided by the product of the desired output and the sum of job times. |  |  |  | | --- | --- | | D. | the product of desired output and the sum of job times divided by daily operating time. |  |  |  | | --- | --- | | E. | 1.00 minus station time. |   If this is smaller than the minimum cycle time, extra workstations will be necessary. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 82. | If a line is balanced with 80 percent efficiency, the "balance delay" will be:      |  |  | | --- | --- | | **A.** | 20 percent. |  |  |  | | --- | --- | | B. | 80 percent. |  |  |  | | --- | --- | | C. | 100 percent. |  |  |  | | --- | --- | | D. | unknown, since balance delay is not related to efficiency. |  |  |  | | --- | --- | | E. | depends on the next operation. |   Efficiency equals 100 percent minus balance delay. |

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| *AACSB: Analytic Accessibility: Keyboard Navigation Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 1 Easy Topic: Designing Product Layouts: Line Balancing* |

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| 83. | The main issue in the design of process layouts for service operations concerns the relative positioning of:      |  |  | | --- | --- | | A. | workstations. |  |  |  | | --- | --- | | B. | processing components. |  |  |  | | --- | --- | | **C.** | departments. |  |  |  | | --- | --- | | D. | entrances, loading docks, etc. |  |  |  | | --- | --- | | E. | manufacturing cells. |   In process layouts, departments and their relative locations are of primary concern. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 84. | Which of the following is not an information requirement for the design of a process layout?      |  |  | | --- | --- | | A. | a list of departments or work centers |  |  |  | | --- | --- | | B. | a projection of work flows between the work centers |  |  |  | | --- | --- | | C. | the distance between locations |  |  |  | | --- | --- | | D. | the cost per unit of distance to move loads |  |  |  | | --- | --- | | **E.** | a list of product cycle times for every product manufactured |   Cycle times do not enter into the design of process layouts. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 1 Easy Topic: Designing Process Layouts* |

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| 85. | Which of the following is not an approach that companies use to achieve a smooth flow of production?      |  |  | | --- | --- | | A. | line balancing heuristics |  |  |  | | --- | --- | | B. | parallel workstations |  |  |  | | --- | --- | | C. | dynamic line balancing (cross-training workers) |  |  |  | | --- | --- | | D. | mixed model line |  |  |  | | --- | --- | | **E.** | Companies use all of these. |   Any of these is a means to achieve smooth flow. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 86. | A common goal in designing process layouts is:      |  |  | | --- | --- | | A. | minimizing the number of workers. |  |  |  | | --- | --- | | B. | minimizing idle time. |  |  |  | | --- | --- | | **C.** | minimizing transportation costs. |  |  |  | | --- | --- | | D. | maximizing workstation productive time. |  |  |  | | --- | --- | | E. | maximizing transportation distances. |   An efficient process layout minimizes transportation costs. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 87. | In the use of closeness ratings for process layouts, the code U means the closeness between two departments is:      |  |  | | --- | --- | | A. | (U)nknown. |  |  |  | | --- | --- | | B. | (U)nusually important. |  |  |  | | --- | --- | | C. | of (U)sual importance. |  |  |  | | --- | --- | | **D.** | (U)nimportant. |  |  |  | | --- | --- | | E. | (U)ndesirable. |   Close department pairings denoted U should be avoided. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 88. | Which closeness rating reflects the undesirability of having two departments located near each other?      |  |  | | --- | --- | | A. | A |  |  |  | | --- | --- | | B. | E |  |  |  | | --- | --- | | C. | I |  |  |  | | --- | --- | | D. | U |  |  |  | | --- | --- | | **E.** | X |   Close department pairings denoted U should be avoided. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 1 Easy Topic: Designing Process Layouts* |

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| 89. | Which closeness rating reflects the highest importance for two departments being close to each other?      |  |  | | --- | --- | | **A.** | A |  |  |  | | --- | --- | | B. | E |  |  |  | | --- | --- | | C. | I |  |  |  | | --- | --- | | D. | U |  |  |  | | --- | --- | | E. | X |   Closeness ratings denoted A should be encouraged. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 1 Easy Topic: Designing Process Layouts* |

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| 90. | Which closeness rating reflects indifference on the nearness or lack of nearness of two departments?      |  |  | | --- | --- | | A. | A |  |  |  | | --- | --- | | B. | E |  |  |  | | --- | --- | | C. | I |  |  |  | | --- | --- | | **D.** | U |  |  |  | | --- | --- | | E. | X |   Closeness ratings denoted U are neither desirable nor undesirable. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 91. | Heuristic rules are used primarily in which of these types of layouts?  (I) Product (II) Process (III) Fixed-position      |  |  | | --- | --- | | A. | I |  |  |  | | --- | --- | | B. | II |  |  |  | | --- | --- | | C. | I and III |  |  |  | | --- | --- | | **D.** | I and II |  |  |  | | --- | --- | | E. | II and III |   Heuristics help in formulating reasonably good product and process layouts. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 3 Hard Topic: Designing Product Layouts: Line Balancing* |

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| 92. | Heuristic rules are usually applied when:      |  |  | | --- | --- | | A. | an optimum is necessary. |  |  |  | | --- | --- | | B. | a computer program is unavailable. |  |  |  | | --- | --- | | C. | a problem has a small number of alternatives. |  |  |  | | --- | --- | | **D.** | a problem has a large number of alternatives. |  |  |  | | --- | --- | | E. | other approaches have failed. |   As the number of alternatives grows, the use of heuristics becomes more attractive. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 93. | An advantage of a U-shaped production line is that:      |  |  | | --- | --- | | A. | it is less compact. |  |  |  | | --- | --- | | B. | communication is reduced among employees. |  |  |  | | --- | --- | | C. | workers are specialists. |  |  |  | | --- | --- | | D. | work assignments are more rigid. |  |  |  | | --- | --- | | **E.** | it is more efficient than a traditional product layout. |   U-shaped lines facilitate teamwork. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 2 Medium Topic: Strategic Resource Organization: Facilities Layout* |

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| 94. | Which of these items would be most likely to be made with a fixed-position layout?      |  |  | | --- | --- | | **A.** | a Boeing 777 jet aircraft |  |  |  | | --- | --- | | B. | applesauce |  |  |  | | --- | --- | | C. | a computer chip |  |  |  | | --- | --- | | D. | toothpaste |  |  |  | | --- | --- | | E. | all of these |   A fixed-position layout brings the process to the product. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 3 Hard Topic: Process Selection* |

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| 95. | A product-focused, single-piece flow, pull production system would be called a:      |  |  | | --- | --- | | **A.** | cellular layout. |  |  |  | | --- | --- | | B. | job shop. |  |  |  | | --- | --- | | C. | assembly line. |  |  |  | | --- | --- | | D. | nonrepetitive process. |  |  |  | | --- | --- | | E. | continuous flow. |   These are characteristics of cellular layouts. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-06 Describe product layouts and their main advantages and disadvantages. Level of Difficulty: 3 Hard Topic: Process Selection* |

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| 96. | Which one of these is a tool used to tell a machine the details of the operations to be performed?      |  |  | | --- | --- | | **A.** | CNC |  |  |  | | --- | --- | | B. | CIM |  |  |  | | --- | --- | | C. | CAD |  |  |  | | --- | --- | | D. | CAM |  |  |  | | --- | --- | | E. | automation |   CNC stores and transmits instructions on operations that are to be performed. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-04 Explain the need for management of technology. Level of Difficulty: 3 Hard Topic: Technology* |

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| 97. | Which of the following is not a primary concern for process selection?      |  |  | | --- | --- | | A. | variety in products/services |  |  |  | | --- | --- | | B. | flexibility of equipment |  |  |  | | --- | --- | | C. | volume of output |  |  |  | | --- | --- | | **D.** | pricing strategy |  |  |  | | --- | --- | | E. | changeover costs |   Pricing strategy does not enter into process selection decisions. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-01 Explain the strategic importance of process selection and the influence it has on the organization and its supply chain. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 98. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      Without regard to demand, what is the minimum possible cycle time (in seconds) for this situation?      |  |  | | --- | --- | | A. | 162 |  |  |  | | --- | --- | | B. | 72 |  |  |  | | --- | --- | | **C.** | 54 |  |  |  | | --- | --- | | D. | 12 |  |  |  | | --- | --- | | E. | 60 |   The longest task time represents the minimum cycle time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 99. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      If the company wants the output rate to be equal to demand, what is the desired cycle time (in seconds)?      |  |  | | --- | --- | | A. | 162 |  |  |  | | --- | --- | | B. | 72 |  |  |  | | --- | --- | | C. | 54 |  |  |  | | --- | --- | | D. | 12 |  |  |  | | --- | --- | | **E.** | 60 |   Divide the demand rate (480) by the number of hours per day (8). This means we need one unit every minute. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 100. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      If the company wants the output rate to be equal to demand, what is the minimum number of workstations needed?      |  |  | | --- | --- | | **A.** | 3 |  |  |  | | --- | --- | | B. | 4 |  |  |  | | --- | --- | | C. | 5 |  |  |  | | --- | --- | | D. | 6 |  |  |  | | --- | --- | | E. | 7 |   Divide the summed task times by the minimum necessary cycle time. Round up to find the theoretical minimum. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 101. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      If the company wants the output rate to be equal to demand, what would be the efficiency of this line with the minimum number of workstations?      |  |  | | --- | --- | | A. | 100 percent |  |  |  | | --- | --- | | B. | 92.5 percent |  |  |  | | --- | --- | | C. | 75 percent |  |  |  | | --- | --- | | D. | 87.5 percent |  |  |  | | --- | --- | | **E.** | 90 percent |   With three workstations, 10 percent of their time is idle. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 102. | A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product are:      If the company wants the output rate to be equal to demand, what is the last task performed at the second workstation in the balance which uses the minimum number of workstations?      |  |  | | --- | --- | | A. | u |  |  |  | | --- | --- | | B. | v |  |  |  | | --- | --- | | C. | w |  |  |  | | --- | --- | | **D.** | x |  |  |  | | --- | --- | | E. | y |   Make sure task interrelationships are not ignored. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 103. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      Without considering forecasted demand, what is the minimum possible cycle time for this production line?      |  |  | | --- | --- | | A. | 10 seconds |  |  |  | | --- | --- | | B. | 20 seconds |  |  |  | | --- | --- | | C. | 34 seconds |  |  |  | | --- | --- | | **D.** | 38 seconds |  |  |  | | --- | --- | | E. | 152 seconds |   The minimum cycle time is equal to the longest task time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 104. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      For output to equal forecasted demand, what should be the actual cycle time for this production?      |  |  | | --- | --- | | A. | 32 seconds |  |  |  | | --- | --- | | B. | 38 seconds |  |  |  | | --- | --- | | **C.** | 40 seconds |  |  |  | | --- | --- | | D. | 76 seconds |  |  |  | | --- | --- | | E. | 152 seconds |   Divide the number of minutes available (600) by the desired demand rate per day (900). The cycle time would have to be two-thirds of a minute. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 105. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      For output to equal forecasted demand, what is the minimum number of workstations needed?      |  |  | | --- | --- | | A. | 1 |  |  |  | | --- | --- | | B. | 3 |  |  |  | | --- | --- | | C. | 3.75 |  |  |  | | --- | --- | | **D.** | 4 |  |  |  | | --- | --- | | E. | 5 |   Divide the total work content by the minimum cycle time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 106. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      For output to equal forecasted demand, what will be the efficiency of the production line that uses the least number of workstations?      |  |  | | --- | --- | | A. | 81 percent |  |  |  | | --- | --- | | B. | 90 percent |  |  |  | | --- | --- | | **C.** | 95 percent |  |  |  | | --- | --- | | D. | 85 percent |  |  |  | | --- | --- | | E. | 100 percent |   This is the amount of idle time left after the line has been balanced. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 107. | QRS Corp. is designing a product layout for a new product. They plan to use this production line 10 hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:      For output to equal forecasted demand, what will be the second task performed at the second workstation of the production line that uses the fewest number of stations?      |  |  | | --- | --- | | A. | a |  |  |  | | --- | --- | | B. | b |  |  |  | | --- | --- | | C. | c |  |  |  | | --- | --- | | D. | d |  |  |  | | --- | --- | | **E.** | e |   Take care to ensure that task interrelationships are not overlooked. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 108. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      Without considering projected demands, what is the minimum possible cycle time for this production line?      |  |  | | --- | --- | | A. | 54 seconds |  |  |  | | --- | --- | | **B.** | 14 seconds |  |  |  | | --- | --- | | C. | 12 seconds |  |  |  | | --- | --- | | D. | 10 seconds |  |  |  | | --- | --- | | E. | 4 seconds |   The minimum possible cycle time equals the longest task time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 109. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      For output to equal projected demand, what should be the actual cycle time for this production line?      |  |  | | --- | --- | | A. | 54 seconds |  |  |  | | --- | --- | | B. | 27 seconds |  |  |  | | --- | --- | | **C.** | 20 seconds |  |  |  | | --- | --- | | D. | 18 seconds |  |  |  | | --- | --- | | E. | 14 seconds |   Divide the number of seconds available by the desired production. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 110. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      For output to equal projected demand, what is the minimum number of workstations needed?      |  |  | | --- | --- | | A. | 6 |  |  |  | | --- | --- | | B. | 4.5 |  |  |  | | --- | --- | | **C.** | 3 |  |  |  | | --- | --- | | D. | 2.7 |  |  |  | | --- | --- | | E. | 2 |   Divide the sum of the task times by the minimum cycle time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 111. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      For output to equal projected demand, what will be the efficiency of the production line that uses the minimum number of workstations?      |  |  | | --- | --- | | **A.** | 93.33 percent |  |  |  | | --- | --- | | B. | 95 percent |  |  |  | | --- | --- | | C. | 97 percent |  |  |  | | --- | --- | | D. | 99 percent |  |  |  | | --- | --- | | E. | 100 percent |   Of the total workstation time available, 6.67 percent will be idle. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 112. | The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.      For output to equal projected demand, what will be the first task performed at the third workstation of the production line which uses the minimum number of stations?      |  |  | | --- | --- | | A. | u |  |  |  | | --- | --- | | B. | v |  |  |  | | --- | --- | | C. | w |  |  |  | | --- | --- | | **D.** | x |  |  |  | | --- | --- | | E. | y |   Take care that task interdependencies aren't overlooked. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 113. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      Without regard to projected demand, what is the minimum possible cycle time for this assembly line?      |  |  | | --- | --- | | A. | 0 seconds |  |  |  | | --- | --- | | B. | 3 seconds |  |  |  | | --- | --- | | **C.** | 9 seconds |  |  |  | | --- | --- | | D. | 10 seconds |  |  |  | | --- | --- | | E. | 28 seconds |   This is equal to the longest task time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 114. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      For output to equal projected demand, what should be the actual cycle time for this assembly line?      |  |  | | --- | --- | | A. | 0 seconds |  |  |  | | --- | --- | | B. | 3 seconds |  |  |  | | --- | --- | | C. | 9 seconds |  |  |  | | --- | --- | | **D.** | 10 seconds |  |  |  | | --- | --- | | E. | 28 seconds |   Divide the number of seconds available by the desired output rate. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 115. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      For output to equal projected demand, what is the minimum number of workstations needed?      |  |  | | --- | --- | | A. | 2 |  |  |  | | --- | --- | | B. | 2.8 |  |  |  | | --- | --- | | **C.** | 3 |  |  |  | | --- | --- | | D. | 4 |  |  |  | | --- | --- | | E. | 5 |   Divide the total work content by the minimum cycle time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 116. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      For output to equal projected demand, what will be the efficiency of the assembly line that uses the minimum number of workstations?      |  |  | | --- | --- | | A. | 0.0 percent |  |  |  | | --- | --- | | B. | 6.7 percent |  |  |  | | --- | --- | | C. | 70.0 percent |  |  |  | | --- | --- | | **D.** | 93.3 percent |  |  |  | | --- | --- | | E. | 100 percent |   This line will be idle 6.7 percent of the time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 117. | A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line six hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:      For output to equal projected demand, what will be the idle time at the second workstation of the assembly line that uses the minimum number of workstations?      |  |  | | --- | --- | | A. | 0 seconds |  |  |  | | --- | --- | | **B.** | 1 second |  |  |  | | --- | --- | | C. | 2 seconds |  |  |  | | --- | --- | | D. | 3 seconds |  |  |  | | --- | --- | | E. | 5 seconds |   Take care that task interrelationships are not overlooked. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 118. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      What is the distance (in meters) from area III to area I in this new facility?      |  |  | | --- | --- | | A. | 0 |  |  |  | | --- | --- | | B. | 10 |  |  |  | | --- | --- | | **C.** | 20 |  |  |  | | --- | --- | | D. | 30 |  |  |  | | --- | --- | | E. | 40 |   This information is presented in the distance matrix. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 119. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      What is the total flow (loads per week) between department Y and department Z?      |  |  | | --- | --- | | A. | 140 |  |  |  | | --- | --- | | B. | 160 |  |  |  | | --- | --- | | C. | 200 |  |  |  | | --- | --- | | D. | 250 |  |  |  | | --- | --- | | **E.** | 300 |   This information is presented in the flow matrix. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 120. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      If departments X, Y, and Z were to be located in areas I, II, and III, respectively, what would be the total distance (in meters) loads would be moved each week?      |  |  | | --- | --- | | A. | 4,000 |  |  |  | | --- | --- | | B. | 4,500 |  |  |  | | --- | --- | | C. | 7,000 |  |  |  | | --- | --- | | **D.** | 8,000 |  |  |  | | --- | --- | | E. | 9,000 |   Multiply the loads conveyed by the distance traveled. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 121. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      What are total weekly costs for the least costly process layout?      |  |  | | --- | --- | | A. | $2,800 |  |  |  | | --- | --- | | B. | $3,150 |  |  |  | | --- | --- | | **C.** | $3,500 |  |  |  | | --- | --- | | D. | $4,000 |  |  |  | | --- | --- | | E. | $4,500 |   Multiply each load meter by the cost per load meter. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 122. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:      How many least costly process layouts are there?      |  |  | | --- | --- | | A. | 1 |  |  |  | | --- | --- | | **B.** | 2 |  |  |  | | --- | --- | | C. | 3 |  |  |  | | --- | --- | | D. | 4 |  |  |  | | --- | --- | | E. | 5 |   There are two layouts that have exactly the same cost. |

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| 123. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      What is the distance (in meters) from area III to area I of this new facility?      |  |  | | --- | --- | | A. | 0 |  |  |  | | --- | --- | | B. | 10 |  |  |  | | --- | --- | | **C.** | 20 |  |  |  | | --- | --- | | D. | 30 |  |  |  | | --- | --- | | E. | 40 |   This is found in the distances matrix. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 124. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      What is the total flow (loads per week) between department Y and department Z?      |  |  | | --- | --- | | A. | 130 |  |  |  | | --- | --- | | B. | 150 |  |  |  | | --- | --- | | C. | 180 |  |  |  | | --- | --- | | D. | 230 |  |  |  | | --- | --- | | **E.** | 280 |   Flows go either from Y to Z or from Z to Y. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 125. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      If the company were to locate departments X, Y, and Z in areas 1, 2, and 3, respectively, what would be the total distance (in meters) loads would be moved each week?      |  |  | | --- | --- | | A. | 3,100 |  |  |  | | --- | --- | | B. | 3,600 |  |  |  | | --- | --- | | C. | 6,200 |  |  |  | | --- | --- | | **D.** | 6,700 |  |  |  | | --- | --- | | E. | 8,200 |   Multiply the loads conveyed by the distance traveled. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 126. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      What is the layout that will minimize the total distance loads will be moved each week?      |  |  | | --- | --- | | A. | X in 1; Y in 2; Z in 3 |  |  |  | | --- | --- | | **B.** | X in 1; Z in 2; Y in 3 |  |  |  | | --- | --- | | C. | Y in 1; X in 2; Z in 3 |  |  |  | | --- | --- | | D. | Z in 1; X in 2; Y in 3 |  |  |  | | --- | --- | | E. | Z in 1; Y in 2; X in 3 |   This is the minimum load-distance layout. |

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| 127. | A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:      What are total weekly costs for an optimum layout?      |  |  | | --- | --- | | **A.** | $2,600 |  |  |  | | --- | --- | | B. | $3,600 |  |  |  | | --- | --- | | C. | $6,200 |  |  |  | | --- | --- | | D. | $7,200 |  |  |  | | --- | --- | | E. | $8,200 |   Multiple the load meters by the cost per load meter. |

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| 128. | Which of the following process types would be most likely to be used in the introductory phase of a product's life cycle?      |  |  | | --- | --- | | A. | continuous |  |  |  | | --- | --- | | B. | intermittent |  |  |  | | --- | --- | | C. | project |  |  |  | | --- | --- | | D. | batch |  |  |  | | --- | --- | | **E.** | job shop |   Job shop processes are more appropriate for relatively new products. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 129. | Which of the following process types would be most likely to be used in the maturity phase of a product's life cycle?      |  |  | | --- | --- | | **A.** | repetitive |  |  |  | | --- | --- | | B. | intermittent |  |  |  | | --- | --- | | C. | project |  |  |  | | --- | --- | | D. | batch |  |  |  | | --- | --- | | E. | job shop |   Continuous processes are more appropriate for highly standardized products in their maturity phase. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 130. | What is it about job shops that make them appropriate for products in the introductory phase of their life cycle?      |  |  | | --- | --- | | A. | efficiency |  |  |  | | --- | --- | | B. | technology |  |  |  | | --- | --- | | **C.** | flexibility |  |  |  | | --- | --- | | D. | high volume capacity |  |  |  | | --- | --- | | E. | rigidity |   Job shop processes are more appropriate for relatively new products. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 131. | What is it about repetitive processes that make them appropriate for products in the maturity phase of their life cycle?      |  |  | | --- | --- | | **A.** | efficiency |  |  |  | | --- | --- | | B. | general-purpose technology |  |  |  | | --- | --- | | C. | possible variety |  |  |  | | --- | --- | | D. | low risk |  |  |  | | --- | --- | | E. | flexibility |   Repetitive processes are more appropriate for mature products, when efficiency is of paramount importance. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-03 Compare the four basic processing types. Level of Difficulty: 1 Easy Topic: Process Selection* |

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| 132. | Although they do not guarantee optimal solutions, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are useful in finding reasonable solutions when the number of possible options is overwhelming.      |  |  | | --- | --- | | A. | cellular layouts |  |  |  | | --- | --- | | **B.** | heuristics |  |  |  | | --- | --- | | C. | logistics |  |  |  | | --- | --- | | D. | CAM |  |  |  | | --- | --- | | E. | CAD |   Heuristics often provide workable solutions to complex problems. |

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| *AACSB: Reflective Thinking Accessibility: Keyboard Navigation Blooms: Remember Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 1 Easy Topic: Designing Product Layouts: Line Balancing* |

**Essay Questions**

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| 133. | Management wants to design an assembly line that will turn out 800 videotapes per day. There will be eight working hours in each day. The industrial engineering staff has assembled the information below:      A) Determine the maximum and minimum cycle times. B) Determine the optimum cycle time. C) What is the minimum number of stations needed? D) Draw the precedence diagram. E) Assign tasks to stations in order of most following tasks first.     A) Maximum cycle time is 2.3 minutes; minimum cycle time is .6 minutes.      D) Refer to the diagram below.      E) See tabular solution below.      Feedback: Use of this heuristic leads to this solution. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 134. | Given the information below, assign departments to locations in a 3 x 3 grid, with department F in the lower right-hand corner.         Example solution:      Feedback: Use of location rules leads to this decision. Note how C and F are as far apart as possible. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 135. | Given the information below, assign the departments A through I to locations in a 3 x 3 grid, with department E fixed in the lower right-hand corner.         Example solution:      Feedback: Location rules lead to this solution. Note that A and G are well removed from one another. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-09 Develop simple process layouts. Level of Difficulty: 2 Medium Topic: Designing Process Layouts* |

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| 136. | Determine the minimum number of workstations needed for this situation:  Operating time is 450 minutes per day. Desired output is 80 units per day. The sum of task times is 56 minutes.     Feedback: Round up to find that 10 stations are needed. |

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| 137. | Given the following data:      Determine the percentage idle time.     (1) Compute the station idle time and the total idle time per cycle:      Feedback: With these four workstations, the maximum efficiency is approximately 88.7 percent. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 138. | Given the following process layout data for locating six departments in the six areas shown:      What process layout(s) satisfy(ies) these closeness ratings?     Any layout with I and VI at one end of the facility, III and IV at the other end, and II and V in the middle.  Feedback: I and VI should be close together. III and IV should be close together. |

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| 139. | Given the following line balance data:      What is the minimum possible cycle time?     21 seconds  Feedback: The minimum possible cycle time is equal to the longest task time. |

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| 140. | Given the following line balance data:      What is the maximum possible cycle time?     81 seconds  Feedback: This assumes only one workstation. |

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| 141. | Given the following line balance data:      What is the appropriate cycle time for eight hours of operating time per day and a desired output rate of 960 units per day?     30 seconds  Feedback: Divide the desired output rate by the number of minutes available per day. |

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| 142. | Given the following line balance data:      For eight hours of operating time per day and a desired output rate of 960 units per day, what is the minimum number of stations needed to achieve the appropriate cycle time?     Three  Feedback: Divide the total work content by the minimum cycle time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 143. | Given the following line balance data:      For eight hours of operating time per day and a desired output rate of 960 units per day, what balance (if any) will yield the minimum number of stations?     Station 1: t, v, x; Station 2: u, w, y; Station 3: z  Feedback: This is the only balanced line that features the theoretical minimum number of workstations. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 144. | Given the following line balance data:      For eight hours of operating time per day and a desired output rate of 960 units per day, what is the percentage of idle time for the balance which uses the minimum number of stations?     10 percent  Feedback: Of the total time allocated to these workstations, 10 percent will be idle time. |

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| *AACSB: Analytic Blooms: Apply Learning Objective: 06-08 Solve simple line-balancing problems. Level of Difficulty: 2 Medium Topic: Designing Product Layouts: Line Balancing* |

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| 145. | Given the following line balance data:      For eight hours of operating time per day and a desired output rate of 960 units per day, what is the efficiency for the balance which uses the minimum number of stations?     90 percent  Feedback: Of the total time allocated to these workstations, 90 percent of it will be occupied. |

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| 146. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      What is the distance from area 3 to area 1?     100 meters  Feedback: This information is found in the distances matrix. |

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| 147. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      What is the total flow between departments B and D?     120 loads per month  Feedback: From B to D there are 70 loads, from D to B there are 50 loads. |

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| 148. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      If departments A through D were to be located in areas 1 through 4, respectively, what would be the total distance loads would be moved each month?     40,000 meters  Feedback: Multiply the loads conveyed by the distance conveyed. |

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| 149. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      If department C must be located in area 1, what layout will minimize the total distance loads will be moved each month?     C in 1; A in 2; D in 3; B in 4  Feedback: This minimizes the total distance loads will be moved if C must be in area 1. |

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| 150. | Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):      If transportation costs are $.25 per load per foot moved, what are total monthly costs for an optimum layout?     $7,000  Feedback: Multiply the total load distance by this cost. |

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