

**1. Which one of the following statements about fixed automation is incorrect**

**A) *most suitable for batch production***

B) high production rates

C) relatively inflexible in accommodating product variety

D) high initial investment for custom-engineered equipment

**2. Interpolator in a CNC machine**

A) controls spindle speed

**B) *coordinates axes movements***

C) operates tool changer

D) commands canned cycle

**3. Which of the following situations is FALSE about manual labor is preferred over automation?**

A) The task is technologically too difficult to automate.

**B) *Long product life cycle.***

C) Customized product.

D) To cope with ups and downs in demand.

**4. Which of the following statements is FALSE about automation?**

A) Automation can be defined as the technology by which a process or procedure is accomplished without human assistance.

**B) *Main advantages of automated manufacturing systems are easy management of process improvements and initial investment.***

C) Safety monitoring in an automated system involves the use of sensors to track the system operation and identify conditions and events that are unsafe or potentially unsafe.

D) A program of instructions is a set of commands that specify the sequence of steps in the work cycle and the details of each step.

**5. What are some of the realities mentioned that modern manufacturing enterprises cope with**

I. Local/international outsourcing

II. Globalization

III. The need for operational efficiency

IV. Contract manufacturing

**I, II, III, IV**

**6. Which of the following statements is FALSE about AGV?**

A) Some types of the vehicles follow electromagnetic signals emitted by the guide wires in the floor.

B) Zone control to implement a blocking system for traffic control.

**C) *The power mechanism for transporting materials is contained in the fixed path using chains, belts, rollers or other mechanical devices.***

D) It used to move palletized loads along predetermined routes.

**7. Which of the following parts is not a component of ROBOT?**

A) Manipulator

B) Controller

C) End-effector

**D) *Switch box***

**8. There are some problems with the manufacturing time. Which factor is the bottleneck?**

- A) The number of machines
- B) The number of set-up workers.
- C) Batch size
- D) Operation time**

**9. Which of the following statements is FALSE about material handling systems?**

- A) recirculating conveyor is a closed-loop conveyor that allows parts or loads to remain on the return loop for one or more revolutions.
- B) Zone control to implement a blocking system is a traffic control method for AGV systems.
- C) Continuous conveyor is a conveyor that moves with stop-and-go motion.**
- D) A conveyor is a mechanical apparatus for moving items or bulk materials, usually inside a facility.

**10. Which of the following statements is FALSE?**

- A) A production system consists of two main parts: Factory Equipment and Manufacturing Support Systems
- B) Some examples of manufacturing support systems: Product design, quality control, production planning, sales, R&D, and inventory control.
- C) A production system is a subset of the manufacturing stem.**
- D) A manufacturing system is a logical grouping of equipment in the factory and the worker(s) who operate(s) it

**11. ... is a reliability metric that indicates the proportion of time that a piece of equipment is up and working properly.**

- A) Efficiency
- B) Availability**
- C) Productivity
- D) Traffic factor

**12. Which of the following statements is FALSE ?**

- A) If customer lead time is less than manufacturing lead time then firms can use make to stock strategy.
- B) If manufacturing lead time is less than customer lead time then firms can use make to order strategy.
- C) Customer lead time is very short for assemble to order strategy.
- D) Manufacturing lead time is very short for an engineer-to-order strategy.**

**13. ... control of the multiple machine tools by a single (mainframe) computer through direct connection and in real time.**

- A) Numerical Control
- B) Direct Numerical Control**
- C) Computer Numerical Control
- D) none of above

**14. Which of the following statements is FALSE about ROBOT?**

- A) The arm consists of rigid links connected by movable joints.
- B) A servo robot is a closed-loop system which allows for feedback which affects the output of the system.
- C) The robot can be programmed by recording actual manual motion or by creating a sequential list of instructions.
- D) *The actuator may have four, five, or even six joints (degrees of freedom).***

**15. Which of the following statements is FALSE?**

- A) *The features of flexible automation are high production rates, and relatively inflexible in accommodating product variety***
- B) Fixed automation is a system in which the sequence of processing (or assembly) operations is fixed by the equipment configuration.
- C) In programmable automation, the production equipment is designed with the capability to change the sequence of operations to accommodate different product configurations.
- D) A flexible automated system is capable of producing a variety of parts (or products) with virtually no time lost for changeovers from one-part style to the next.

**16. Which one of the following principles is not one of the main principles of the U.S.A?**

- A) Value chain analysis
- B) *Cloud Technology***
- C) Lean Manufacturing
- D) Automation migration strategy

**What is the difference between Group Technology, Cellular Manufacturing, and FMS?**

GT groups similar parts to standardize work; CM arranges machines into cells to make those part families; FMS is a highly automated, computer-controlled cell that flexibly switches among parts.

**Performance measures for storage systems?**

Space utilization (storage density, % of cubic capacity used)  
Throughput (transactions/orders picked per hour)  
Average cycle/retrieval time (putaway + pick time per load)  
Inventory accuracy (record vs. physical count, % correct)

- **Bottleneck** is the slowest workstation in a production line, and therefore it limits the pace of the entire line.