

# KNOWLEDGE INSTITUTE OF TECHNOLOGY

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*Beyond Knowledge*

**Question Bank**

**COMPUTER INTEGRATED MANUFACTURING SYSTEMS**

**Department of Mechanical Engineering**

**TWO MARKS QUESTIONS AND ANSWERS**

**UNIT I – INTRODUCTION**

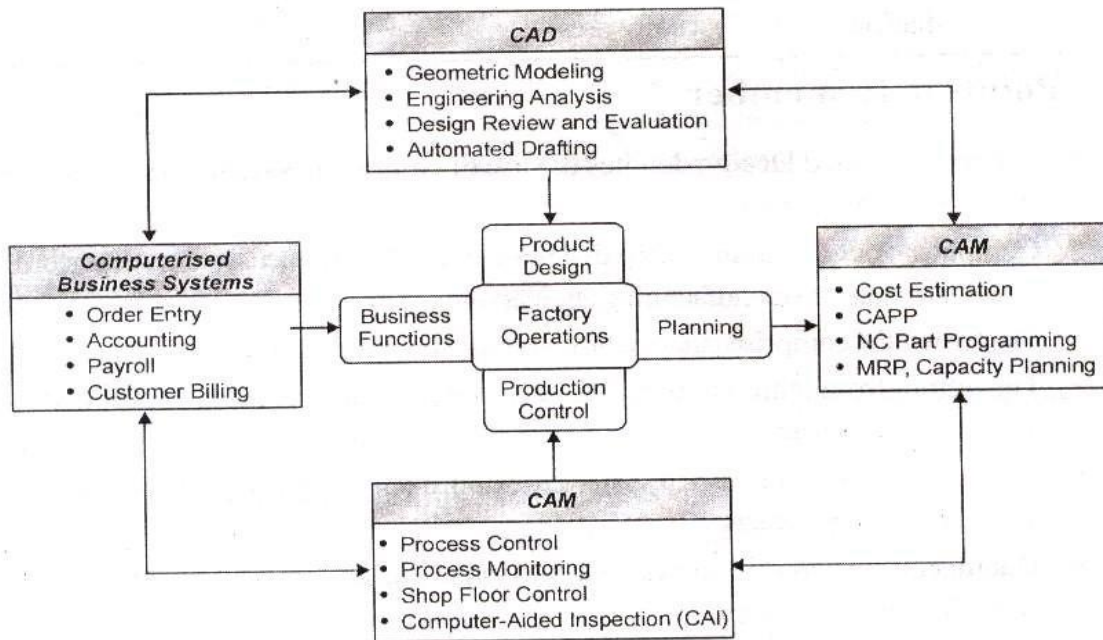
**PART A**

**1. Define CIM.**

CIM is the integration of the total manufacturing enterprise through the use of integrated systems and data communications coupled with new managerial philosophies

**2. What are the components or Elements of CIM?**

2. What are the components of CIM?



**3. What is the role of CIM in manufacturing?**

CIM is most closely associated with functions in manufacturing engineering such a process planning and numerical control (NC) part programming.

**4. What are important applications of CIM in manufacturing planning?**

The applications of CIM can be divided into two broad categories.

- 1) Manufacturing planning
- 2) Manufacturing control

**5. What are the important applications of CIM in manufacturing control?**

◆ The applications of computer process control are pervasive today in automated production systems.

◆ Quality control includes a variety of approaches to ensure the highest possible quality levels in the manufactured product.

- 1) ◆ Shop floor control refers to production management techniques.

**6. Define CAD**

Computer-aided design(CAD) is defined as the application of computers and graphics software to aid or enhance the product design from conceptualization to documentation. CAD is most commonly associated with the use of an interactive computer graphics system, referred to as a

CAD system. Computer-aided design systems are powerful tools and in the mechanical design and geometric modeling of products and components.

There are several good reasons for using a CAD system to support the engineering design function:

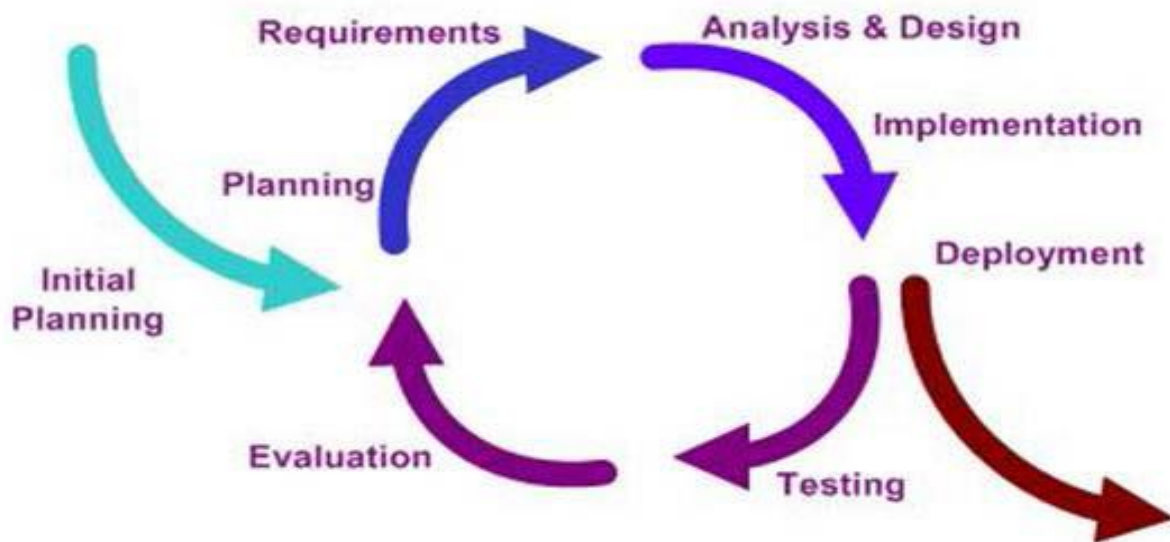
- To increase the productivity
- To improve the quality of the design
- To uniform design standards
- To create a manufacturing data base
- To eliminate inaccuracies caused by hand-copying of drawings and inconsistency between Drawings

### 7. Define CAM

Computer-aided manufacturing(CAM) is defined as the effective use computer technology in manufacturing planning and control. CAM is most closely associated with functions in manufacturing engineering, such as process and production planning, machining, scheduling, management, quality control, and numerical control(NC) part programming. Computer-aided design and computer-aided manufacturing are often combined CAD/CAM systems.

### 8. Define Concurrent Engineering

The integrated design of products and processes, including manufacture and support.



### 9.Types of production.

1. Lean production
2. Just in time production
3. Batch production
4. Job production
5. Continuous Production
6. Mass production

**10. Define automation.**

Automation is generally defined as the process of having machines follow a predetermined sequence of operations with little or no human labour, using specialized Equipment and devices that performs and control manufaction processes.

**11. What are the goals of automation in manufacturing industry?**

Automation has the following primary goals.

- i) Process Integration
- ii) Improve Productivity
- iii) Economize on floor space
- v) Improve quality

**12. What are the function of automated manufacturing system?**

Automating manufacturing systems operate in the factory on the physical product. They perform operations such as processing, assembly, inspection, or material handing, in some cases accomplishing more than one of these operations in the same systems.

**13. Give the classification of automation.**

Automated manufacturing systems can be classified into three basic types:

- 1) Fixed automation
- 2) Programmable automation
- 3) Flexible automation.

**14. What are the benefits of automation?**

- To increase labour productivity
- To reduce labour cost
- To mitigate the effects of labour shortages
- To reduce or eliminate routine and clerical takes
- To improve worker safety.

**15. The ten rules of lean production.:**

- 1. Eliminate waste
- 2. Minimize inventory
- 3. Maximize flow
- 4. Pull production from customer demand
- 5. Meet customer requirements
- 6. Do it right the first time
- 7. Empower workers
- 8. Design for rapid changeover
- 9. Partner with suppliers
- 10. Create a culture of continuous improvement.

**16. Lean Production or Lean Manufacturing.**

Lean Production is a manufacturing/production system best characterized as relentlessly eliminating waste from all of its' activities and operations. Lean strives to produce products (and deliver services):

- On-Time

- Using as few resources as possible
- Better than competitors
- Faster & Cheaper than competitors
- While Eliminating as Much Waste as Possible.

### **17. Just-in-time (JIT)**

Just-in-time (JIT) manufacturing is a production model in which items are created to meet demand, not created in surplus or in advance of need. The purpose of JIT production is to avoid the waste associated with overproduction, waiting and excess inventory.

### **18. What are the approaches of physical distributions?**

- Customer service: What level of customer service should be provided?
- Transportation: How will the products be shipped?
- Warehousing: Where will the goods be located? How many warehouses should be utilized?
- Order processing: How should the order be handled?
- Inventory control: How much inventory should be maintained at each location?
  
- Protective packing and materials handling: How can efficient methods be developed for handling goods in the factory, warehouse, and transport terminals?

### **19. What are the capabilities of computer control?**

The capabilities are:

- 1) Polling (or) Data sampling
- 2) Interlocks
- 3) Interrupt system
- 4) Exception handling

### **20. Explain the types of interlocks.**

There are two types of interlocks:

- Input interlocks ii) Output interlocks
- i) Input interlocks: An input interlocks that originates from an external device. (e.g., a limit switch, sensor, or production machine) and is sent to the controller.
  - ii) Output interlocks: An output interlock is a signal from sent the controller to same external devises. It is used to control the activities of each external device and coordinate its operation with that of the other equipment in the cell.

## **UNIT II PRODUCTION PLANNING AND CONTROL AND COMPUTERISED**

### **PROCESS PLANNING**

#### **PART A**

### **1.What is Process planning?**

Process planning consists of preparing a set of instructions that describe how to fabricate a part or build an assembly which will satisfy engineering design specifications. Process planning is the systematic determination of the methods by which product is to be manufactured, economically and competitively.

## **2.What are the results of Process Planning?**

Routings which specify operations, operation sequences, work centers, standards, tooling and fixtures. This routing becomes a major input to the manufacturing resource planning system to define operations for production activity control purpose and define required resources for capacity requirements planning purposes.

\*Process plans which typically provide more detailed, step-by-step work instructions including dimensions related to individual operations, machining parameters, set-up instructions, and quality assurance checkpoints.

\*Fabrication and assembly drawings to support manufacture (as opposed to engineering drawings to define the part)

## **3. Define CAPP.**

Main idea to develop computer aided process planning is to structure the data concerning part planning is to structure the data concerning part design, manufacturing facilities and capabilities design, manufacturing facilities and capabilities into categories. CAPP is the method of automatically generating CAPP is the method of automatically generating the sequence of manufacturing operations. the sequence of manufacturing operations. CAPP provides the opportunity to produce CAPP provides the opportunity to produce manufacturing routings which are rational, consistent and even optimal.

## **4. Characteristics of CAPP:**

CAPP capable of understanding and analyzing the part characteristics. analyzing the part characteristics. It possess knowledge about machine tools, cutting tools, etc.. tools, cutting tools, etc.. It possess the capabilities of analyzing the interdependencies between part, interdependencies between part, machining process, quality, cost. Machining process, quality, cost. It possess multiple calculating capabilities.

## **5. Types of CAPP:**

- Generative process planning.
- Variant process planning

## **6. Define Variant Process Planning:**

This system works on the basis of group the basis of group technology and parts classification and coding. Parts are grouped into the part families on the basis of design and manufacturing attributes. This parts are called master parts. Process plan for the part is created by recalling, Process plan for the part is created by recalling, identification and retrieving an existing plan for identification and retrieving an existing plan for identical parts and making needful modifications identical parts and making needful modifications for a new part.

## **7. Define Generative process planning:**

It is the system which creates plan by means of It is the system which creates plan by means of decision logic, formulas and other logical decision logic, formulas and other logical procedures.

## **8. Benefits of CAPP:**

Increases Reduces Productivity Consistency of plans Accuracy of plans Capacity utilization Ability to Introduce New technology Lead time of Process plan Routine clerical work Mfg. and process Planning cost Work in progress Skill requirement Of planner.

## 9. Aggregate planning as an Operational Tool

Aggregate planning helps achieve balance between operation goal, financial goal and overall strategic objective of the organization. It serves as a platform to manage capacity and demand planning.

## 10. Importance of Aggregate Planning

Aggregate planning plays an important part in achieving long-term objectives of the organization. Aggregate planning helps in:

- Achieving financial goals by reducing overall variable cost and improving the bottom line
- Maximum utilization of the available production facility
- Provide customer delight by matching demand and reducing wait time for customers
- Reduce investment in inventory stocking
- Able to meet scheduling goals there by creating a happy and satisfied work force

## 11. Aggregate Planning Strategies

There are three types of aggregate planning strategies available for organization to choose from. They are as follows.

### 1. Level Strategy

As the name suggests, level strategy looks to maintain a steady production rate and workforce level. In this strategy, organization requires a robust forecast demand as to increase or decrease production in anticipation of lower or higher customer demand. Advantage of level strategy is steady workforce. Disadvantage of level strategy is high inventory and increase back logs.

### 2. Chase Strategy

As the name suggests, chase strategy looks to dynamically match demand with production. Advantage of chase strategy is lower inventory levels and back logs. Disadvantage is lower productivity, quality and depressed work force.

### 3. Hybrid Strategy

As the name suggests, hybrid strategy looks to balance between level strategy and chase strategy.

## 12. Material requirements planning (MRP)

Material requirements planning (MRP) is a production planning and inventory control system. An MRP integrates data from production schedules with that from inventory and the bill of materials (BOM) to calculate purchasing and shipping schedules for the parts or components required to build a product.

## 13. What is 'Manufacturing Resource Planning - MRP II'

Manufacturing Resource Planning (MRP II) is an integrated information system used by businesses. Manufacturing Resource Planning (MRP II) evolved from early Materials Requirement Planning (MRP) systems by including the integration of additional data, such as employee and financial needs. The system is designed to centralize, integrate and process information for effective decision making in scheduling, design engineering, inventory management and cost control in manufacturing.

**14. What is 'Enterprise Resource Planning - ERP'**

Enterprise resource planning (ERP) is a process by which a company (often a manufacturer) manages and integrates the important parts of its business. An ERP management information system integrates areas such as planning, purchasing, inventory, sales, marketing, finance and human resources.

**15. What is the primary function of SFC?**

**Functions of SFC system**

- Priority control and assignment of shop orders
- Maintain information on work in process for MRP
- Monitor shop order status information
- Provide production output data for capacity control purposes

**16. What are the phases of SFC?**

The three phases or modules are:

1. Order Release
2. Order Scheduling
3. Order Progress

**17. What is the purpose of FDS?**

The purpose of the Factory Data Collection (FDS) system in shop floor control is to provide basic data for monitoring order progress. In a computerized SFC system these data are submitted to the order progress module for analysis and generation of work order status reports and exception reports.

**18. What is an Automatic Data Capture (ADC) method?**

Automatic Identification methods is also known as Automatic Data Capture (ADC) it is refers to the technologies that provides direct entry of data into the computer or other control systems without using a keyboards. These technologies require no human involvement in the data capture and entry process.

**19. What are the technologies used in ADC?**

1. Optical
2. Magnetic type
3. Electromagnetic type
4. Smart card
5. Touch techniques
6. Biometric

**20. What are the types of SFC?**

The types of SFC data that would be collected the FDC system include

- Labour time turned in against a job
- Count on scrapped parts or needing rework.
- Piece counts
- Machine breakdowns.
- Completion of operations in the routing sequence.

**UNIT III CELLULAR MANUFACTURING**

**PART A**

**1. Define Group Technology (GT).**

Group Technology (GT) is a manufacturing methodology in which indential or similar components grouped processed together during design, process planning and manufacturing so that a wide variety of components can be manufactured, at the least expense of time, inventory, man hours and material handling.

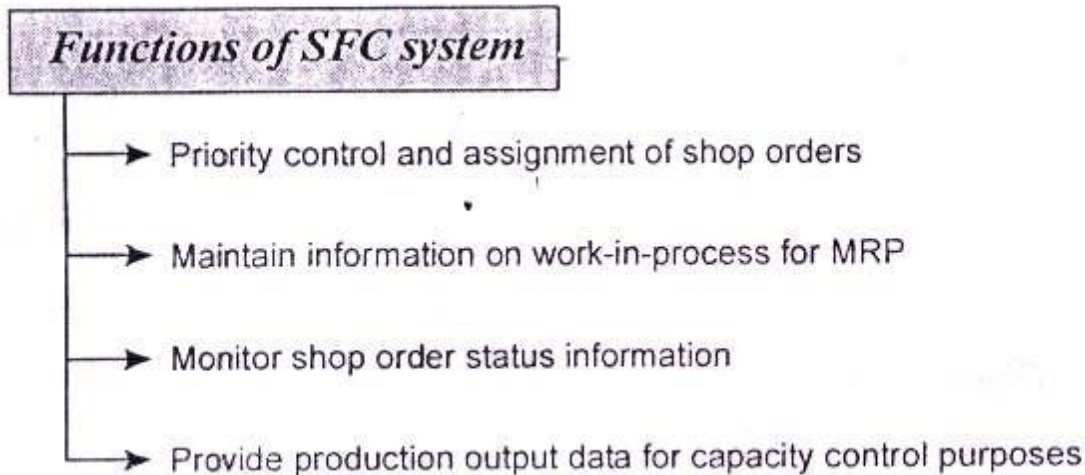
**2. List out the stages in Group Technology.**

- a) Production planners to setup the GT database.
- b) Grouping the parts or components into part-families with some similar characteristics.
- c) Re-design the shop-floor arrangement according to common shape, function or manufacturing process and tooling.

**3. Define Part families.**

Part-family is defined as" collection of parts which are similar in terms of geometric shape, size, and similar processing steps requird in manufacturing, so flow of materials through the plant improves".

**4. What are the methods available for solving problems in GT?**



**5. List the two categories of attributes of parts.**

- 1) Design attributes, which are concerned with part characteristics such as geometry, size, and material.
- 2) Manufacturing attributes, which consider the sequence of processing steps required to make a part.

**6. List out the premises for the developed of DCLASS code.**

- i) A part may be best characterized bytes basic shape, usually is most apartment attribute.
- ii) A Each basic shape may have several features, such as holes, slots, threads and grooves.
- iii) A part can be completely characterized by basic shape; size; precision and material type, from and condition.
- iv) Several short code segments can be linked to from classification code that is human recognizable and adequate for human monitoring.

v) Each of these code segments can point to more detailed information.

### **7. What is PFA?**

Production flow analysis is a technique for pre-planning the division of the whole factory into groups or departmental groups. When the knowledge of division is available, then it is possible to plan the layout.

### **8. What is the weakness of PFA?**

The weakness of production flow analysis (PFA) that the data used are derived from production route-sheets. But the process-sequences have been prepared by different process planners and the difference is reflected on to these route-sheets.

### **9. What are the applications of GT?**

1. **Design:** In a firm many components have similar shape. They can be grouped into design families and a design can be created by simply modifying an existing component design from the same family.

2. **In Manufacturing:** For this purpose GT gives a great importance than simply a design philosophy. Parts that are not similar in shape may still need similar manufacturing processes. Parts of this type are called production family. (All parts may need same operation like drilling, milling thread cutting etc.)

3. **Process Planning:** Process planning work can be facilitated as similar processes are needed for all components of a particular family. This helps production planning and control much easier because only similar parts are considered for each cell. Such a cell-oriented layout is called a group technology layout or cellular layout.

### **10. What is cellular Manufacturing?**

A lean method of producing similar products using cells, or groups of team members, workstations, or equipment, to facilitate operations by eliminating setup and unneeded costs between operations. Cells might be designed for a specific process, part, or a complete product. They are favorable for single-piece and one-touch production methods and in the office or the factory. Because of increased speed and the minimal handling of materials, cells can result in great cost and time savings and reduced inventory.

### **11. How can you classify a manufacturing cell?**

- Single machine cell
- Group machine cell with manual handling
- Group machine cell with semi-integrated handling
- Flexible manufacturing cell or Flexible manufacturing system.

### **12. List any six coding systems that are widely recognized in industries.**

- Opitz classification system
- MICLASS System
- DCLASS System
- CODE System
- KK-3 system
- CUTPLAN system

### **13. List the steps involved in production flow analysis.**

- Data collection
- Sortation of process routings
- Preparation of PFA chart

- Cluster analysis.

**14. List any four reasons for implementing cellular manufacturing.**

- Reduced manufacturing lead time
- Reduced work-in-process
- Improved part quality
- Increased manufacturing flexibility

**15. List the function of MRP II System**

- Management planning
- Customer service
- Operation planning
- Operation execution
- Financial function

**16. What is the factor to be considered in selection of coding system.**

1. objective of the classification system.
2. robustness- capability of handling all parts now being sold or planned to be sold by the firm
3. Expandability-ability to cope up with future demands.
4. Automation-for computer use.

**17. List the various layouts.**

- ✓ Line or production layout
- ✓ Function or process layout
- ✓ Group or combination layout

**18. What is composite part?**

- ✓ A composite part is a hypothetical part which includes all of the design and manufacturing attributes of a family
- ✓ The composite is a hypothetical part that can be completely processed in a manufacturing cell.

**19. What are the three basic coda structures used in GT application.**

- Visual inspection
- Parts classification and coding system
- Production flow analysis

**20. What do you mean by form code and supplementary code in opitz classification system?**

- The Opitz coding scheme uses the following digit sequence:

12345 6789 ABCD

- The first five digits (12345) code the major design attributes of a part and are called the form code.

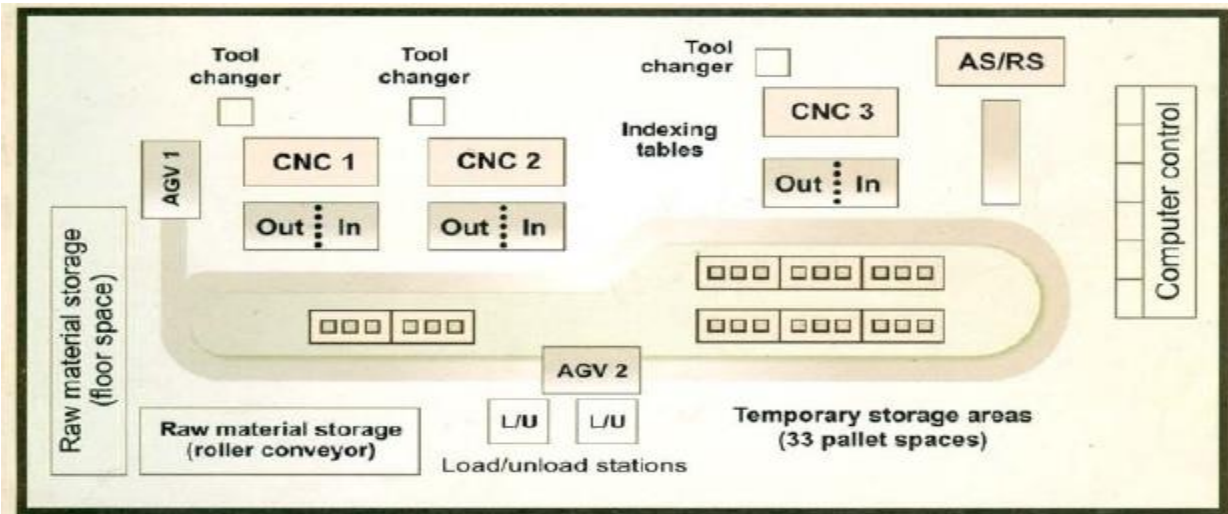
**UNIT IV FLEXIBLE MANUFACTURING SYSTEM (FMS) AND AUTOMATED  
GUIDED VEHICLE SYSTEM (AGVS)**

**PART A**

**1. Define is FMS?**

FMS is a manufacturing system based on multi-operation machine tools, incorporating (automatic part handling and storage).

**2. Component of FMS**



**3. List different types of data files required for a FMS.**

- ✓ Part program file
- ✓ Routing file
- ✓ Part production file
- ✓ Pallet reference file
- ✓ Station tool file
- ✓ Tool life file.

**4. What are types of FMS.**

- Loop type
- Ladder type
- Open type
- Robot centered type
- Progressive type
- Line type

**5. Write the Benefits of FMS.**

- Decreased lead times
- Increased through put

Increased machine utilization  
Improved due date reliability  
Decreased work in progress  
Increased quality

## 6. Define AGV

An **automated guided vehicle** or automatic guided vehicle (**AGV**) is a mobile robot that follows markers or wires in the floor, or uses vision, magnets, or lasers for navigation. They are most often used in industrial applications to move materials around a manufacturing facility or warehouse.

## 7. Write the Application of AGV.

- Assembly line
- Custom
- Delivery of supplies
- Finished product
- Pallet handling
- Raw material handling
- Roll handling

## 8. What are the components of FMS?

Flexible Manufacturing Systems (FMS) consists of the following four components.

1. Processing stations or workstations
2. Material handling and storage
3. Computer control system
4. Human labor

## 9. What are the FMS layout configurations? FMSs can be divided into five categories

- 1) In-line layout
- 2) Loop layout
- 3) Ladder layout
- 4) Open field layout
- 5) Robot-centered cell.

## 10. What are the functions of computers in FMS?

The functions of computers in FMS

1. Workstation control
2. Distribution of control instructions to workstations
3. Production control
4. Traffic control
5. Shuttle control
6. Work piece monitoring
7. Tool control
8. Performance monitoring and reporting
9. Diagnosis

## 11. List the applications of FMSs.

Applications of FMS installations are in the following areas.

- Machining

- Assembly
- Sheet-metal press-working
- Forging
- Plastic injection molding
- Welding
- Textile machinery manufacture
- Semiconductor component manufacture

**12. Give the benefits of FMSs.**

The benefits that can be expected from an FMS include

- Increased machine utilization
- Fewer machines required
- Reduction in factory floor space required
- ◆ Greater responsiveness to change
- Reduced inventory requirements
- Lower manufacturing lead times
- Reduced direct labour requirements and higher labor productivity
- Opportunity for unattended production

**13. List any two advantages and disadvantages of FMS implementation.**

*Advantages*

- Faster, lower-cost changes from one part to another which will improve capital utilization.
- Lower direct labor cost, due to the reduction in number of workers.

*Disadvantages*

- Substantial pre-planning activity.
- Expensive, costing millions of dollars.

**14. How does FMS classified based on level of flexibility?**

FMS classified based on level of flexibility as,

- Production flexibility
- Machine flexibility
- Mix flexibility
- Product flexibility

**15. How does FMS classified based on number of machines?**

- Single Machine Cell (SMC)
- Flexible Manufacturing Cell (FMC)
- Flexible Manufacturing System (FMS)

**16. What are the functions of computers in FMS?**

The functions of computers in FMS

1. Workstation control
2. Distribution of control instructions to workstations
3. Production control
4. Traffic control

**17. List out four types of flexibility.**

- Part verity test
- Schedule change test
- Error recovery test
- New part test

**18. List major issues of design for the creation of FMS.**

- Types of workstation

- Variations in process routings and FMS layout
- Material handling system
- Work in process and storage capacity
- Tooling
- Pallet fixtures.

**19. List major issues of planning for the creation of FMS.**

- Part family considerations
- Processing requirement
- Physical characteristics of the work parts
- Production volume

**20. List any three vehicle guidance technologies employed in AGV.**

- Wire guidance system
- Paint strips system
- Self-guided vehicles.

## **UNIT V INDUSTRIAL ROBOTICS**

### **PART A**

**1. What is an Industrial Robot?**

An industrial robot is a general-purpose, programmable machine possessing certain anthropomorphic characteristics. The most obvious anthropomorphic characteristics of an industrial robot is its mechanical arm, which is used to perform various industrial tasks.

**2. What are the important of robot.**

- Robot can be substituted for humans in hazardous or uncomfortable work environments.
- Perform its work cycle with a consistency and repeatability that cannot be attained by humans.
- Controlled by computer and connected to other computer.

**3. What is Manipulator.**

An industrial robot consists of a series of joints and links. Robot anatomy is concerned with the types and sizes of these joints and links and other aspects of the manipulators physical construction.

**4.What is degree-of-freedom.in robot.**

A joint of an industrial robot is similar to a joint in the human body.it provides relative motion between two parts of the body .each joint or axis as it is sometimes called, provides the robot with a so called degree-of-freedom.

**5. What are the types of joints in robots.**

- ❖ Linear joint(L Joint)
- ❖ Orthogonal(O Joint)
- ❖ Rotational joint(R Joint)
- ❖ Twisting joint(T Joint)
- ❖ Revolving joint(V Joint)

**6.What are the types of sections in robot Manipulator.**

- .body-and-arm assembly
- wrist assembly

**7.What are the types of configurations in robot.**

- ✓ Polar configuration
- ✓ Cylindrical configuration
- ✓ Cartesian coordinate robot
- ✓ Jointed-arm robot
- ✓ SCARA

**8.Classification of robot controller.**

- Limited sequence control
- Playback with point-to-point control
- Playback with continuous path control
- Intelligent control.

**9.What is End Effectors in robot.**

The end effector enables the robot to accomplish a specific task.because there is a wide variety of tasks performed by industrial robots,the end effector is usually custom-engineered and fabricated for each different application.

**10. Two categories of End Effectors.**

- Grippers
- Tools

### 11. What is grippers.

Grippers are end effectors used to grasp and manipulated objects during the work cycle. The objects are usually workparts that are moved from one location to another in the cell.

### 12. What are the types of Grippers.

- Mechanical grippers.
- Vacuum grippers.
- Magnetized devices
- Adhesive devices
- Simple mechanical devices.

### 13. Application of robots

- Material handling
  - Material transfer
  - Machine loading and unloading
- Processing operation
  - Spot welding
  - Arc welding
  - Spray coating
  - Water jet cutting
  - Laser cutting
  - Grinding, drilling
- Assembly and inspection.

### 14. What are the types of Robot programming.

- ✓ Lead through programming
- ✓ Motion programming

#### 1) Define transducer.

A sensor is a transducer, which is a device that converts a physical variable of one form into another form that is more useful for the given application.

#### 2) Define sensor.

Sensor is a device that convert a physical stimulus or variable of interest into a more convenient form for the purpose of measuring the stimulus.

### 15. Classification of sensor

- Range sensor
- Proximity sensor

- Acoustic sensor
- Vision sensor

**16. Types of driving systems in industrial robots.**

- Hydraulic drive system
- Pneumatic drive system
- Electric drive system

**17. Types of control in robots**

- Limited sequence control
- Playback with point-to-point control
- Playback with continuous path control
- Intelligent control

**18. Classification of end-effectors**

- ❖ Grippers
- ❖ End –of- the-arm-tooling

**19. Types of Grippers**

- ❖ Mechanical grippers
- ❖ Magnetic grippers
- ❖ Vacuum grippers
- ❖ Scoops, hooks grippers

**20. Three measures of precision of the robots movement**

- Control resolution
- Accuracy
- repeatability

**BRIEF QUESTIONS**

**UNIT I - INTRODUCTION**

**PART B**

- 1) Briefly Explain concurrent engineering and draw the diagram.
- 2) Explain about CIM Wheel and CAD/CAM Integration.
- 3) Briefly Explain any two types of production system.
- 4) Discussion about Basic Element of Automated System.
- 5) Draw the flow diagram of level of automation.
- 6) Define Automation. Explain Advance automation function.
- 7) Types of Lean production and Explain Just-in- time production.
- 8) Explain about khanban manufacturing system in just-in-time.
- 9) Explain manufacturing planning and manufacturing control.
- 10) Explain about manufacturing models and Metrics.

**PART C**

- 1) Explain the design process proposed by shigley and application of computer to the design process.
- 2) Classify the production system. Compare and contrast the characteristics of each of them.
- 3) What do you understand by lean production? Explain in detail, the objective, principle, structure, and various concepts of lean production.
- 4) Explain the five levels of automation and control in manufacturing.
- 5) List various components of cost. How can you classify costs in manufacturing?

**UNIT II PRODUCTION PLANNING AND CONTROL AND COMPUTERISED  
PROCESS PLANNING**

**PART B**

- 1) Define Process planning and Advantages of process planning
- 2) Draw the flow diagram of Retrieval CAPP System and Explain.
- 3) Explain about CAPP System and advantages.
- 4) Explain about Aggregated Production Planning & Master production Schedule.
- 5) Draw the diagram of Material Requirement Planning.
- 6) Define Control System. Explain any one type with flow diagram.
- 7) Brief on Manufacturing Resources Planning- II
- 8) Draw and Explain about Shop floor Control.
- 9) Differentiate between inventory control and shop floor control.
- 10) Explain about Enterprise Resource Planning.

**PART C**

- 1) Explain the various approaches commonly used in CAPP Systems bringing out their advantages and limitations.
- 2) Briefly explain the steps involved in generation of route sheet using variant approach CAPP.
- 3) Explain the procedure for developing MPS with an illustration and a flow chart.
- 4) Describe the fixed-period quantity inventory model? Also compare and contrast P-System with Q-System.
- 5) Explain, in detail, the fixed- order quantity inventory levels? Also list merit, demerit and suitability of this model.

**UNIT III CELLULAR MANUFACTURING**

**PART B**

- 1) Define Group Technology and Explain about Process Planning and Group Technology Layout with suitable Layout diagram.
- 2) Schematic diagram of Optiz coding system and give suitable example.
- 3) Define Production flow analysis and Explain about four steps in PFA.
- 4) Define Cellular Manufacturing and give details about composite part concept.
- 5) Define Machine cell design and Explain four types of layout with sketch.
- 6) Explain Quantitative analysis in Cellular Manufacturing
- 7) Explain about Arranging Machines in a GT cell using Hollier Method.
- 8) Advantage of Group Technology (GT) and limitation.
- 9) Explain the composite part concept in cellular manufacturing.
- 10) Discuss with examples the following : Monocode, Polycode and mixed code.

**PART C**

- 1) How a facility is designed using GT?
- 2) Write the application of rank order clustering algorithm and Hollier method 2?
- 3) Explain DCLASS and MCLASS Coding system.
- 4) What do you understand by the term key machine in group technology?
- 5) Explain the four common GT cell configurations. Also discuss the suitable layouts for each of them.

**UNIT IV FLEXIBLE MANUFACTURING SYSTEM (FMS) AND AUTOMATED**

**GUIDED VEHICLE SYSTEM (AGVS)**

**PART B**

- 1) Draw the components of FMS and explain.
- 2) Types of FMS and explain any two types with suitable sketch.

- 3) Draw the Layout of FMS and Explain.
- 4) Benefits and Applications of FMS.
- 5) Classify FMS Analysis Techniques and explain any two types.
- 6) Explain about Path Control System in AGV and its function.
- 7) Described Vehicle Management and Safety in AGV and how?
- 8) Briefly Explain AGVs Application.
- 9) How described FMS Planning and explain control of FMS.
- 10) Types of quantitative analysis may be used with regard to FMS.

### **PART C**

- 1) List & Explain the functions of the material handling system in FMS.
- 2) Identify the various functions that are performed by the FMS computer control system.
- 3) Explain in detail, FMS workstation and List the applications of FMS.
- 4) Explain in detail, the two aspects of vehicle management.
- 5) Examine what is flexible manufacturing system? In what ways, FMS differs from other manufacturing systems.

## **UNIT V INDUSTRIAL ROBOTICS**

### **PART B**

- 1) Classification of industrial Robots and its application.
- 2) What are the entire basic Component's in Robotic and advantages and Robotics?
- 3) Define Sensor and explain any four types of sensors in Robotics.
- 4) Short notes on: (i) Lead through Program  
(ii) Manual Program
- 5) Explain (a) Repeatability (b) Accuracy  
(c) End-Effectors (d) Robot Anatomy
- 6) Define Robotics and Explain about Robot Configuration.
- 7) Types of Robots Programing and Explain about Robot joints and its Advantages.
- 8) List out the industrial Robotics Application and explain Assembly section and loading and unloading Robot with suitable sketch.
- 9) List our four common robot configuration and explain its applications
- 10) List the different types of robotic movements.

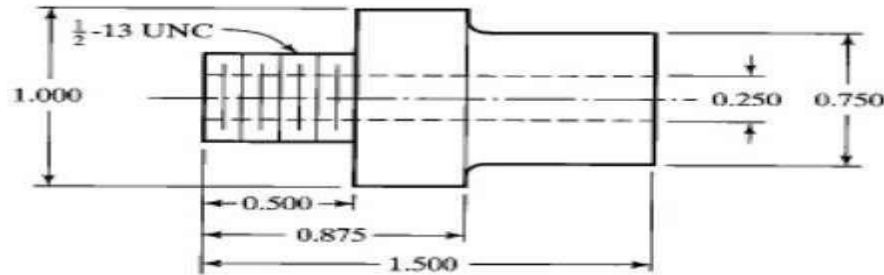
### **PART C**

- 1) Identify and Draw the neat sketch of components of teach pendant and explain briefly
- 2) Explain in detail robot language structure and motion commands used.

- 3) Explain at least four languages meant for robot programming and briefly discuss the features of any two of them.
- 4) Formulate principle of operation of teach pendent.
- 5) Analyse a Program for pick and place robot.

### CASE STUDIES

- 1) Analyze a case study on manufacturing in competitive environment
- 2) Analyze various implementation issues on KANBANS and JIT systems.
- 3) Generalize the conditions that need to be fulfilled in order to implement JIT concept effectively.
- 4) Illustrate the form code (first five digits) in the Opitz system for a given part.



- 5) Develop a case study of an industrial environment of cellular manufacturing.
- 6) Analyze a case study of an AGVS
- 7) Assume that yourself as industrial engineer ,write a brief report on how robotic automation works to improve productivity in engineering industries?
- 8) Analyze a case study on reduction of industrial traffic accidents by using FMS and AGV System.
- 9) Develop a brief report on manufacturing resource planning (MRP II) in manufacturing industries.

**COMPUTER INTEGRATED MANUFACTURING SYSTEMS  
NPTEL LINKS FOR VARIOUS LECTURES**

**Group Technology and Computer Aided Process Planning:**

[http://nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/Computer%20Aided%20Design%20&%20ManufacturingII/Module%20G/Module%20G\(5\)/p3.htm](http://nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/Computer%20Aided%20Design%20&%20ManufacturingII/Module%20G/Module%20G(5)/p3.htm)

<http://www.nptel.ac.in/courses/112107142/23>

[http://nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/Computer%20Aided%20Design%20&%20ManufacturingII/Module%20G/Module%20G\(5\)/p1.htm](http://nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/Computer%20Aided%20Design%20&%20ManufacturingII/Module%20G/Module%20G(5)/p1.htm)

**Computer Aided Planning and Control:**

<http://www.nptel.ac.in/courses/112102103/>

<http://nptel.ac.in/courses/112107143/>

<http://nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/project%20and%20production%20management/mod9/mod93.htm>

<http://nptel.ac.in/courses/110106045/>

**Computer Monitoring:**

<http://www.nptel.ac.in/courses/112107142/33>

<http://www.nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/Computer%20Aided%20Design%20&%20ManufacturingI/index.htm>

**Integrated Manufacturing System:**

<http://www.nptel.ac.in/courses/112102011/>

<http://nptel.ac.in/courses/110106044/>

<http://nptel.ac.in/courses/112107143/36>

<http://nptel.ac.in/courses/112103174/35>

**Flexible manufacturing systems (FMS):**

<http://nptel.ac.in/courses/112103174/module1/lec2/3.html>

[www.elearning.vtu.ac.in/11/enotes/CompIntManf/unit1-KM.pdf](http://www.elearning.vtu.ac.in/11/enotes/CompIntManf/unit1-KM.pdf)

<http://nptel.ac.in/courses/112107077/38>

<http://nptel.ac.in/courses/112103174/module1/lec2/1.html>

<http://nptel.ac.in/courses/112102011/>

<https://www.class-central.com/tag/manufacturing>