

CENTRAL POLYTECHNIC COLLEGE, THARAMANI – 600113.

(An Autonomous Institution)

**DEPARTMENT OF MECHANICAL ENGINEERING
(CAD)**



QUESTION BANK

**EMC51010 - COMPUTER AIDED DESIGN AND
MANUFACTURING**

(E – SCHEME)

UNIT Q
NO

QUESTIONS

- 1 11 Which is not a typical stage of Shigley's design process?
(a) Problem definition (b) Synthesis
(c) Welding process planning (d) Analysis and optimization
Ans:Welding process planning
- 1 12 Concurrent engineering aims to
(a) Carry out design and downstream activities in parallel (b) Increase sequential delays
(c) Freeze design early and avoid iteration (d) Separate manufacturing from design
Ans:Carry out design and downstream activities in parallel
- 1 13 Sequential engineering is characterized by
(a) A linear department wise hand off of tasks (b) Parallel execution of tasks
(c) Integrated teams (d) Design for X focus
Ans:A linear department wise hand off of tasks
- 1 14 One major guideline of DFMA is to
(a) Minimize part count (b) Maximize part count
(c) Increase fasteners (d) Prefer unique materials
Ans:Minimize part count
- 1 15 FEA stands for
(a) Final Engineering Analysis (b) Finite Element Analysis
(c) Functional Element Approximation (d) Finite Error Assessment
Ans:Finite Element Analysis
- 1 16 The first basic step in FEA is
(a) Discretization (meshing) of the domain (b) Post processing
(c) Applying boundary conditions (d) Assembly of global matrices
Ans:Discretization (meshing) of the domain
- 1 17 An advantage of FEA is
(a) Ability to analyze complex geometries and boundary conditions (b) Lower computational cost than hand calcs in all cases
(c) Exact analytical results always (d) No need for validation
Ans:Ability to analyze complex geometries and boundary conditions
- 1 18 Which file format is most closely associated with AutoCAD interoperability?
(a) STEP (b) DXF
(c) STL (d) JT
Ans:DXF
- 1 19 Which of the following is not a graphics standard?
(a) GKS (b) CIM
(c) IGES (d) DXF
Ans:CIM
- 1 20 Which statement about IGES is true?
(a) It is a vendor neutral standard for exchanging CAD geometry (b) It is a finite element solver file
(c) It is a raster image format (d) It is used only for CAM data
Ans:It is a vendor neutral standard for exchanging CAD geometry

UNIT	Q NO	QUESTIONS
1	21	<p>A star topology in a CAD lab means</p> <p>(a) All nodes connected to a central hub/switch (b) Nodes connected in a loop</p> <p>(c) Nodes connected in series (d) Random peer to peer links</p> <p>Ans:All nodes connected to a central hub/switch</p>
1	22	<p>In Shigley’s process after analysis typically comes</p> <p>(a) Problem definition (b) Optimization / decision making</p> <p>(c) Concept generation (d) Detailed manufacturing</p> <p>Ans:Optimization / decision making</p>
1	23	<p>CAD improves productivity mainly by</p> <p>(a) Reducing design cycle time and errors (b) Eliminating the need for engineers</p> <p>(c) Making hand drafting obsolete but slower (d) Increasing rework</p> <p>Ans:Reducing design cycle time and errors</p>
1	24	<p>The core of a CAD graphics pipeline deals with</p> <p>(a) Modelling transformations and rendering (b) Payroll management</p> <p>(c) MRP II (d) AGV routing</p> <p>Ans:Modelling transformations and rendering</p>
1	25	<p>DXF files are typically</p> <p>(a) ASCII or binary representations of drawing entities (b) Bitmap images</p> <p>(c) Audio streams (d) Finite element meshes only</p> <p>Ans:ASCII or binary representations of drawing entities</p>
1	26	<p>Which is not an FEA step?</p> <p>(a) Element formulation (b) CNC toolpath generation</p> <p>(c) Assembly of global matrices (d) Application of loads and boundary conditions</p> <p>Ans:CNC toolpath generation</p>
1	27	<p>One limitation of FEA is</p> <p>(a) Results depend on mesh quality and boundary conditions (b) It cannot be used for heat transfer</p> <p>(c) It cannot handle 3D problems (d) It always gives exact answers</p> <p>Ans:Results depend on mesh quality and boundary conditions</p>
1	28	<p>Concurrent Engineering reduces</p> <p>(a) Time to market (b) Cross functional communication</p> <p>(c) Manufacturability (d) Product quality</p> <p>Ans:Time to market</p>
1	29	<p>DFMA primarily targets</p> <p>(a) Ease of manufacture and assembly (b) Increasing parts and fasteners</p> <p>(c) Purely aesthetic improvements (d) Only serviceability</p> <p>Ans:Ease of manufacture and assembly</p>
1	30	<p>A bus topology means</p> <p>(a) All nodes share a single communication line (b) A central hub connects all nodes</p>

(c) Each node is connected to exactly two others forming a loop (d) Fully connected mesh of nodes

Ans: All nodes share a single communication line

UNIT	Q NO	QUESTIONS
1	31	Which of the following is a graphics standards family? (a) GKS (b) MRP (c) JIT (d) ERP Ans:GKS
1	32	CAD/CAM data exchange improved historically because of (a) Neutral formats like IGES and STEP (b) Proprietary lock ins only (c) Rasterization standards (d) Shop floor control systems Ans:Neutral formats like IGES and STEP
1	33	The decision making stage in Shigley's process often includes (a) Trade off studies and selection of best alternative (b) Only mesh refinement (c) Toolpath generation (d) Heat treatment design Ans:Trade off studies and selection of best alternative
1	34	The main need for graphics standards is to (a) Ensure device independence and portability of graphics applications (b) Avoid using CAD (c) Eliminate 3D modelling (d) Promote proprietary formats Ans:Ensure device independence and portability of graphics applications
1	35	In FEA the domain is divided into (a) Finite elements (b) Infinite parts (c) Exact analytical regions (d) Beams only Ans:Finite elements
1	36	Post processing in FEA includes (a) Plotting stress/strain contours and interpreting results (b) Creating tool magazines (c) Selecting spindle drives (d) Drafting G code Ans:Plotting stress/strain contours and interpreting results
1	37	The CAD database typically stores (a) Geometry topology attributes and metadata (b) Only raster images (c) Only FE meshes (d) Only NC programs Ans:Geometry topology attributes and metadata
1	38	One major output of CAD that feeds CAM is (a) 3D solid/feature model (or drawing) data (b) HR evaluation (c) Marketing brochures (d) AGV traffic plans Ans:3D solid/feature model (or drawing) data
1	39	In DFMA design for assembly specifically focuses on (a) Reducing assembly time and complexity (b) Increasing fasteners (c) Maximizing distinct parts (d) Eliminating modularity Ans:Reducing assembly time and complexity
1	40	A ring topology means

(a) Each node connected to two others forming a loop

(b) All nodes connected to a central hub

(c) All nodes share one backbone

(d) Everyone connected to everyone else

Ans: Each node connected to two others forming a loop

UNIT	Q NO	QUESTIONS
1	41	Shigley's process ends with (a) Problem definition (b) Presentation/communication of results (c) Concept generation (d) Meshing Ans:Presentation/communication of results
1	42	Which of the following is most concerned with data exchange among CAD tools? (a) IGES (b) FEA (c) DFMA (d) Concurrent Engineering Ans:IGES
1	43	One major reason to adopt concurrent engineering is (a) Early involvement of manufacturing and other stakeholders (b) To make the process strictly linear (c) To delay testing (d) To reduce communication Ans:Early involvement of manufacturing and other stakeholders
1	44	A solid modeller primarily handles (a) Complete volume representation and Boolean operations (b) Only wireframe edges (c) Only 2D drafting (d) Only FE meshes Ans:Complete volume representation and Boolean operations
1	45	Which stage in FEA deals with choosing element type (a) Pre processing (b) Solution (c) Post processing (d) Validation Ans:Pre processing
1	46	DFM attempts to (a) Match design features to process capabilities (b) Ignore process constraints (c) Focus only on assembly (d) Only reduce part count Ans:Match design features to process capabilities
1	47	DXF and IGES are similar because they both (a) Are neutral formats that facilitate CAD data exchange (b) Are mesh solvers (c) Are proprietary FEA outputs (d) Are CNC controller languages Ans:Are neutral formats that facilitate CAD data exchange
1	48	In FEA boundary conditions are applied to (a) Constrain degrees of freedom and apply loads (b) Choose the CAD kernel (c) Decide network topology (d) Define procurement strategy Ans:Constrain degrees of freedom and apply loads
1	49	A key drawback of sequential engineering is (a) Long iteration cycles due to late discovery of manufacturability issues (b) Over communication (c) Too much parallelism (d) No documentation Ans:Long iteration cycles due to late discovery of manufacturability issues
1	50	GKS primarily aimed to provide (a) A device independent API for (b) CAM post processing

computer graphics

(c) Robot programming

(d) FE meshing

Ans: A device independent API for computer graphics

UNIT	Q NO	QUESTIONS
2	1	<p>CAM stands for</p> <p>(a) Computerized Advanced Machining (b) Computer Aided Manufacturing</p> <p>(c) Computer Automated Mechanism (d) Control Aided Method</p> <p>Ans:Computer Aided Manufacturing</p>
2	2	<p>Which of the following is a function of CAM</p> <p>(a) Data encryption (b) Tool path generation</p> <p>(c) Financial planning (d) Email automation</p> <p>Ans:Tool path generation</p>
2	3	<p>Which of the following is a benefit of CAM</p> <p>(a) Increased paperwork (b) Increased errors</p> <p>(c) Reduced lead time (d) Increased downtime</p> <p>Ans:Reduced lead time</p>
2	4	<p>CIM stands for</p> <p>(a) Computer Intelligent Management (b) Centralized Interface Module</p> <p>(c) Computer Integrated Manufacturing (d) Common Integration Method</p> <p>Ans:Computer Integrated Manufacturing</p>
2	5	<p>Which one is NOT a part of CIM</p> <p>(a) CAD (b) CAM</p> <p>(c) SFC (d) LAN networking</p> <p>Ans:LAN networking</p>
2	6	<p>Which is a component of the CIM wheel</p> <p>(a) Power supply (b) Marketing</p> <p>(c) Quality Control (d) Billing</p> <p>Ans:Quality Control</p>
2	7	<p>The CIM wheel is a representation of</p> <p>(a) Shop floor layout (b) Business integration model</p> <p>(c) IT infrastructure (d) Programming cycles</p> <p>Ans:Business integration model</p>
2	8	<p>MRP stands for</p> <p>(a) Machine Resource Planning (b) Material Requirements Planning</p> <p>(c) Manufacturing Routing Process (d) Mechanical Routing Plan</p> <p>Ans:Material Requirements Planning</p>
2	9	<p>MRP-II includes</p> <p>(a) Capacity planning (b) Financial planning</p> <p>(c) Material planning (d) All of the above</p> <p>Ans:All of the above</p>
2	10	<p>Master Production Schedule defines</p> <p>(a) Tool selection process (b) Machine breakdown report</p> <p>(c) Quantity and timing of product output (d) Floor cleaning schedule</p> <p>Ans:Quantity and timing of product output</p>

UNIT	Q NO	QUESTIONS
2	11	<p>What is the aim of JIT</p> <p>(a) Increase buffer stock (b) Eliminate wastage</p> <p>(c) Increase inventory (d) Lengthen lead time</p> <p>Ans:Eliminate wastage</p>
2	12	<p>JIT is a</p> <p>(a) Production system (b) Storage technique</p> <p>(c) File management method (d) Cost accounting tool</p> <p>Ans:Production system</p>
2	13	<p>What is the function of SFC (Shop Floor Control)</p> <p>(a) Email scheduling (b) Tracking production processes</p> <p>(c) Marketing control (d) Logistics planning</p> <p>Ans:Tracking production processes</p>
2	14	<p>CAPP stands for</p> <p>(a) Computer Aided Part Processing (b) Computer Aided Process Planning</p> <p>(c) Computer Assisted Product Planning (d) Calculated Approach for Process Planning</p> <p>Ans:Computer Aided Process Planning</p>
2	15	<p>Variant CAPP uses</p> <p>(a) Artificial Intelligence (b) Expert Systems</p> <p>(c) Group Technology (d) Neural Networks</p> <p>Ans:Group Technology</p>
2	16	<p>Generative CAPP can</p> <p>(a) Copy existing plans (b) Create new plans using logic</p> <p>(c) Only edit templates (d) Convert code to machine language</p> <p>Ans:Create new plans using logic</p>
2	17	<p>Process planning involves</p> <p>(a) Setting sales targets (b) Determining manufacturing methods</p> <p>(c) Creating business proposals (d) Designing the product logo</p> <p>Ans:Determining manufacturing methods</p>
2	18	<p>A major benefit of CIM is</p> <p>(a) Fragmented data flow (b) Manual data entry</p> <p>(c) Integrated information systems (d) Long setup time</p> <p>Ans:Integrated information systems</p>
2	19	<p>CAD and CAM integration allows</p> <p>(a) Manual transfer of data (b) Elimination of automation</p> <p>(c) Seamless design-to-production flow (d) Use of different file formats only</p> <p>Ans:Seamless design-to-production flow</p>
2	20	<p>The purpose of MRP-II is to</p> <p>(a) Manage marketing (b) Extend MRP functionalities</p> <p>(c) Design the product (d) Increase raw material wastage</p> <p>Ans:Extend MRP functionalities</p>

UNIT	Q NO	QUESTIONS
2	21	Which system plans the usage of machine hours (a) MPS (b) CAPP (c) Capacity Planning (d) JIT Ans:Capacity Planning
2	22	CIM integrates (a) Only design tools (b) Entire business and manufacturing processes (c) Office equipment (d) Only CNC machines Ans:Entire business and manufacturing processes
2	23	Which one is NOT a function of CAM (a) NC code generation (b) Tool path simulation (c) Email processing (d) Automated machining Ans:Email processing
2	24	The goal of process planning is to (a) Improve marketing (b) Define manufacturing steps (c) Avoid shop floor operations (d) Increase design time Ans:Define manufacturing steps
2	25	Which type of CAPP is based on standard plans (a) Neural (b) Hybrid (c) Variant (d) Generative Ans:Variant
2	26	What does CAPP eliminate (a) CAD modeling (b) Manual process planning (c) CAM simulation (d) Shop floor layout Ans:Manual process planning
2	27	MPS is short for (a) Manufacturing Process Sheet (b) Master Production Schedule (c) Material Planning System (d) Mechanized Production Software Ans:Master Production Schedule
2	28	A JIT system helps in (a) Inventory stockpiling (b) Delivery delays (c) Minimizing waste (d) Extending lead times Ans:Minimizing waste
2	29	Which system manages raw material inventory (a) JIT (b) MRP (c) MPS (d) CAM Ans:MRP
2	30	Which CAPP system is more flexible (a) Variant (b) Manual (c) Generative (d) Integrated Ans:Generative

UNIT	Q NO	QUESTIONS
2	31	<p>CAPP contributes to</p> <p>(a) Cost increase (b) Standardized process plans</p> <p>(c) Labor inefficiency (d) Manual scheduling</p> <p>Ans:Standardized process plans</p>
2	32	<p>Which is a key objective of CIM</p> <p>(a) Data redundancy (b) Manual record-keeping</p> <p>(c) Automation and integration (d) File segmentation</p> <p>Ans:Automation and integration</p>
2	33	<p>What role does CAM play in CIM</p> <p>(a) Controls accounting (b) Executes production</p> <p>(c) Designs products (d) Stores emails</p> <p>Ans:Executes production</p>
2	34	<p>What is a major advantage of CAM systems</p> <p>(a) Manual dependency (b) Inaccurate production</p> <p>(c) Consistent output (d) Paper-based planning</p> <p>Ans:Consistent output</p>
2	35	<p>A key outcome of integrated CAD/CAM is</p> <p>(a) Poor quality (b) Long production time</p> <p>(c) Automatic data flow (d) Increased documentation</p> <p>Ans:Automatic data flow</p>
2	36	<p>The evolution of CIM includes</p> <p>(a) Manual inventory systems (b) Punch card billing</p> <p>(c) Transition from standalone to integrated systems (d) Disk-based payroll</p> <p>Ans:Transition from standalone to integrated systems</p>
2	37	<p>CAPP improves manufacturing by</p> <p>(a) Promoting guesswork (b) Removing planning</p> <p>(c) Automating and standardizing planning (d) Replacing CAD</p> <p>Ans:Automating and standardizing planning</p>
2	38	<p>What does MRP calculate</p> <p>(a) Tool wear (b) Material needs and scheduling</p> <p>(c) Employee salaries (d) Machine idle time</p> <p>Ans:Material needs and scheduling</p>
2	39	<p>One drawback of manual process planning</p> <p>(a) Fast and accurate (b) Time-consuming and inconsistent</p> <p>(c) Fully automated (d) High repeatability</p> <p>Ans:Time-consuming and inconsistent</p>
2	40	<p>The full form of JIT is</p> <p>(a) Join-In-Time (b) Just-In-Time</p> <p>(c) Joint Inventory Tracking (d) Job Initial Testing</p> <p>Ans:Just-In-Time</p>

UNIT	Q NO	QUESTIONS
2	41	<p>CIM systems reduce</p> <p>(a) Integration (b) Productivity</p> <p>(c) Design cost (d) Cycle time</p> <p>Ans:Cycle time</p>
2	42	<p>Which planning system directly affects MRP</p> <p>(a) CAD (b) CAM</p> <p>(c) MPS (d) ERP</p> <p>Ans:MPS</p>
2	43	<p>Shop Floor Control helps in</p> <p>(a) Advertising (b) Marketing analysis</p> <p>(c) Tracking job status and work orders (d) Internet browsing</p> <p>Ans:Tracking job status and work orders</p>
2	44	<p>CAM software helps to</p> <p>(a) Write essays (b) Perform banking</p> <p>(c) Generate NC programs (d) Draw blueprints</p> <p>Ans:Generate NC programs</p>
2	45	<p>CAPP results in</p> <p>(a) Higher human error (b) Greater reliance on handwritten notes</p> <p>(c) Standardized and optimized process plans (d) Decreased consistency</p> <p>Ans:Standardized and optimized process plans</p>
2	46	<p>Generative CAPP uses</p> <p>(a) Decision logic and rules (b) Employee feedback</p> <p>(c) Punch cards (d) Manual input only</p> <p>Ans:Decision logic and rules</p>
2	47	<p>Capacity planning ensures</p> <p>(a) Inadequate production (b) Enough resources for production demand</p> <p>(c) Random delays (d) Late deliveries</p> <p>Ans:Enough resources for production demand</p>
2	48	<p>Which software is mainly used in CAM</p> <p>(a) Photoshop (b) AutoCAD</p> <p>(c) Mastercam (d) MS Word</p> <p>Ans:Mastercam</p>
2	49	<p>One key advantage of JIT</p> <p>(a) Maximized stock (b) Minimum stock and zero waste</p> <p>(c) Increased warehousing (d) High buffer inventory</p> <p>Ans:Minimum stock and zero waste</p>
2	50	<p>CIM enables</p> <p>(a) Standalone production stages (b) Integrated and optimized production processes</p> <p>(c) Manual design (d) Trial-and-error method</p> <p>Ans:Integrated and optimized production processes</p>

UNIT	Q NO	QUESTIONS
3	1	CNC stands for (a) Central Numeric Code (c) Computer Numerical Control Ans:Computer Numerical Control
		(b) Computerized Numerical Coding (d) Common Numerical Control
3	2	Which part of CNC machine controls its operation? (a) Spindle (c) Bed Ans:Control unit
		(b) Control unit (d) Chuck
3	3	The basic types of CNC systems are (a) Point-to-point and continuous path (c) Open loop and closed loop Ans:Both A and C
		(b) Linear and angular (d) Both A and C
3	4	In CNC, interpolation is used to (a) Stop the tool (c) Move tool along desired path Ans:Move tool along desired path
		(b) Maintain speed (d) Change tool
3	5	Linear interpolation command in G-code (a) G01 (c) G03 Ans:G01
		(b) G02 (d) G04
3	6	G02 code is used for (a) Linear interpolation (c) Circular interpolation CCW Ans:Circular interpolation CW
		(b) Circular interpolation CW (d) Dwell
3	7	G03 is used for (a) Clockwise arc (c) Counter-clockwise arc Ans:Counter-clockwise arc
		(b) Tool offset (d) None
3	8	Vertical motion axis in CNC (a) X (c) Z Ans:Z
		(b) Y (d) A
3	9	CNC program is written using (a) English (c) G and M codes Ans:G and M codes
		(b) Java (d) BASIC
3	10	Preparatory function (a) G-code (c) T-code Ans:G-code
		(b) M-code (d) S-code

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3	11	<p>Not a benefit of CNC</p> <p>(a) Reduced labor (b) Higher accuracy (c) Increased setup time (d) Consistent quality</p> <p>Ans:Increased setup time</p>
3	12	<p>Closed loop system uses</p> <p>(a) Feedback (b) Manual input (c) No control (d) Mechanical cams</p> <p>Ans:Feedback</p>
3	13	<p>Open loop system lacks</p> <p>(a) Control unit (b) Feedback (c) Stepper motor (d) G-code</p> <p>Ans:Feedback</p>
3	14	<p>CNC lathe is used for</p> <p>(a) Drilling (b) Milling (c) Turning (d) Grinding</p> <p>Ans:Turning</p>
3	15	<p>M-code to stop program</p> <p>(a) M00 (b) M02 (c) M03 (d) M04</p> <p>Ans:M02</p>
3	16	<p>Code to start spindle clockwise</p> <p>(a) M02 (b) M03 (c) M04 (d) M05</p> <p>Ans:M03</p>
3	17	<p>CNC machining center capability</p> <p>(a) Turning only (b) Drilling only (c) Milling and drilling (d) Planning only</p> <p>Ans:Milling and drilling</p>
3	18	<p>G90 code represents</p> <p>(a) Incremental programming (b) Absolute programming (c) Coolant off (d) Return to home</p> <p>Ans:Absolute programming</p>
3	19	<p>G91 indicates</p> <p>(a) Incremental programming (b) Spindle start (c) Tool call (d) Program stop</p> <p>Ans:Incremental programming</p>
3	20	<p>M06 function</p> <p>(a) Start spindle (b) Stop machine (c) Tool change (d) Coolant on</p> <p>Ans:Tool change</p>

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3	21	Part providing motion in CNC (a) Bed (c) Control panel Ans: Servo motor
		(b) Servo motor (d) Spindle nose
3	22	G04 is used for (a) Dwell time (c) Tool path Ans: Dwell time
		(b) Feedrate change (d) Cancel offset
3	23	M08 and M09 are used for (a) Lubrication (c) Coolant ON/OFF Ans: Coolant ON/OFF
		(b) Tool change (d) Program end
3	24	Not a CNC axis (a) A (c) C Ans: D
		(b) B (d) D
3	25	Tool nose radius compensation (a) G41/G42 (c) G30 Ans: G41/G42
		(b) G44 (d) G50
3	26	CNC programming is done in (a) AutoLISP (c) G&M code Ans: G&M code
		(b) Java (d) C++
3	27	CNC milling machine typical axes (a) 2 (c) 4 Ans: 3
		(b) 3 (d) 6
3	28	Position control in CNC by (a) Hydraulic actuator (c) Relays Ans: Stepper/servo motors
		(b) Stepper/servo motors (d) Limit switches
3	29	Main open/closed loop difference (a) Voltage (c) Feedback Ans: Feedback
		(b) Current (d) Power
3	30	G00 means (a) Rapid positioning (c) Circular move Ans: Rapid positioning
		(b) Linear move (d) Tool off

UNIT	Q NO	QUESTIONS
3	31	CNC machine reduces (a) Accuracy (c) Productivity Ans:Waste
		(b) Waste (d) Tool life
3	32	End of program code (a) M03 (c) M30 Ans:M30
		(b) M06 (d) G90
3	33	Tool offset is used for (a) Workpiece clamping (c) Adjusting tool position Ans:Adjusting tool position
		(b) Feedrate change (d) Motor tuning
3	34	Spindle speed control code (a) S1000 (c) G04 Ans:S1000
		(b) T01 (d) G28
3	35	T code is used for (a) Tool number (c) Speed Ans:Tool number
		(b) Feedrate (d) Offset
3	36	M05 means (a) Coolant on (c) Feed hold Ans:Spindle stop
		(b) Spindle stop (d) Tool call
3	37	Feed rate code (a) G90 (c) S Ans:F
		(b) F (d) M03
3	38	Interpolation means (a) Data entry (c) Spindle start Ans:Path calculation
		(b) Path calculation (d) G-code conversion
3	39	Work zero point is defined by (a) G54 (c) T01 Ans:G54
		(b) M08 (d) G28
3	40	CNC part program starts with (a) % (c) \$ Ans:%
		(b) # (d) T

UNIT	Q NO	QUESTIONS
3	41	<p>Circular interpolation CW</p> <p>(a) G03 (b) G02</p> <p>(c) G01 (d) G04</p> <p>Ans:G02</p>
3	42	<p>Coolant OFF M-code</p> <p>(a) M08 (b) M09</p> <p>(c) M06 (d) M03</p> <p>Ans:M09</p>
3	43	<p>System with feedback device</p> <p>(a) Open loop (b) Closed loop</p> <p>(c) Manual (d) Basic</p> <p>Ans:Closed loop</p>
3	44	<p>CNC reduces</p> <p>(a) Precision (b) Automation</p> <p>(c) Human errors (d) Cost efficiency</p> <p>Ans:Human errors</p>
3	45	<p>Soft limit is</p> <p>(a) Mechanical stop (b) Emergency stop</p> <p>(c) Software-defined axis limit (d) Limit switch</p> <p>Ans:Software-defined axis limit</p>
3	46	<p>Cycle time is</p> <p>(a) Idle time (b) Full machining cycle time</p> <p>(c) Loading time (d) Break time</p> <p>Ans:Full machining cycle time</p>
3	47	<p>Tool length offset stored as</p> <p>(a) G28 (b) H code</p> <p>(c) M03 (d) G54</p> <p>Ans:H code</p>
3	48	<p>Work offset assigned with</p> <p>(a) G54 (b) M06</p> <p>(c) T01 (d) G04</p> <p>Ans:G54</p>
3	49	<p>CNC program format starts with</p> <p>(a) % (b) #</p> <p>(c) \$ (d) T</p> <p>Ans:%</p>
3	50	<p>Device giving positional feedback</p> <p>(a) ATC (b) Encoder</p> <p>(c) Tool magazine (d) Spindle motor</p> <p>Ans:Encoder</p>

UNIT	Q NO	QUESTIONS
4	1	Rapid Prototyping is primarily used for: (a) Mass production (b) Tool sharpening (c) Prototype development (d) Surface finishing Ans:Prototype development
4	2	Which of the following is not a subtractive method? (a) CNC milling (b) Drilling (c) 3D Printing (d) Grinding Ans:3D Printing
4	3	Additive manufacturing is also known as: (a) Casting (b) Layered manufacturing (c) Welding (d) Subtractive modeling Ans:Layered manufacturing
4	4	Which process uses photopolymerization? (a) SLS (b) STL (c) FDM (d) CNC Ans:STL
4	5	In FDM, the material is: (a) Photopolymer (b) Molten powder (c) Thermoplastic filament (d) Liquid resin Ans:Thermoplastic filament
4	6	Which RP process uses a laser to sinter powder? (a) FDM (b) SLA (c) SLS (d) PolyJet Ans:SLS
4	7	Which is NOT an application of rapid prototyping? (a) Design validation (b) Aesthetic testing (c) Tool sharpening (d) Form-fit evaluation Ans:Tool sharpening
4	8	Which of the following materials is used in SLA? (a) Nylon (b) PLA (c) Photopolymer resin (d) ABS Ans:Photopolymer resin
4	9	Which technique is best for plastic prototypes? (a) EDM (b) FDM (c) Milling (d) Turning Ans:FDM
4	10	3D printing is also called: (a) CNC modeling (b) Additive manufacturing (c) Electroforming (d) Subtractive machining Ans:Additive manufacturing

UNIT	Q NO	QUESTIONS
4	11	<p>What is a key advantage of rapid prototyping?</p> <p>(a) Low surface finish (b) Long production time (c) Fast design iteration (d) Limited geometry</p> <p>Ans:Fast design iteration</p>
4	12	<p>Rapid tooling refers to:</p> <p>(a) Cutting tools (b) Quickly fabricated molds (c) Welding machines (d) Lathes</p> <p>Ans:Quickly fabricated molds</p>
4	13	<p>Which method uses powder as material input?</p> <p>(a) SLA (b) FDM (c) SLS (d) EDM</p> <p>Ans:SLS</p>
4	14	<p>Which process is NOT additive in nature?</p> <p>(a) FDM (b) SLS (c) CNC milling (d) SLA</p> <p>Ans:CNC milling</p>
4	15	<p>Which of the following is used in biomedical implants?</p> <p>(a) FDM (b) SLA (c) SLS (d) Die casting</p> <p>Ans:SLS</p>
4	16	<p>Which process builds layer by layer using thermoplastic?</p> <p>(a) FDM (b) EDM (c) SLS (d) SLA</p> <p>Ans:FDM</p>
4	17	<p>The main classification of RP is into:</p> <p>(a) Thermal and Electrical (b) Additive and Subtractive (c) CAD and CAM (d) Manual and Automatic</p> <p>Ans:Additive and Subtractive</p>
4	18	<p>Which file format is common in RP?</p> <p>(a) DWG (b) STL (c) PDF (d) DXF</p> <p>Ans:STL</p>
4	19	<p>Which material is not commonly used in 3D printing?</p> <p>(a) PLA (b) Nylon (c) Cast iron (d) ABS</p> <p>Ans:Cast iron</p>
4	20	<p>STL stands for:</p> <p>(a) Standard Transmission Layout (b) Stereolithography (c) Standard Tool List (d) Structural Tool Layer</p> <p>Ans:Stereolithography</p>

UNIT	Q NO	QUESTIONS
4	21	<p>Group Technology (GT) is based on:</p> <p>(a) Product layout (b) Functional layout</p> <p>(c) Part similarities (d) Worker efficiency</p> <p>Ans:Part similarities</p>
4	22	<p>The concept of part families is based on:</p> <p>(a) Color (b) Size</p> <p>(c) Similarity in design/manufacturing (d) Material only</p> <p>Ans:Similarity in design/manufacturing</p>
4	23	<p>Which of the following is NOT a benefit of GT?</p> <p>(a) Reduced setup time (b) Lower productivity</p> <p>(c) Reduced inventory (d) Better material handling</p> <p>Ans:Lower productivity</p>
4	24	<p>What is the first step in GT implementation?</p> <p>(a) Design (b) Manufacturing</p> <p>(c) Part classification (d) Coding</p> <p>Ans:Part classification</p>
4	25	<p>Parts classification is done using:</p> <p>(a) Micrometer (b) Part family tables</p> <p>(c) Coding systems (d) CAD software</p> <p>Ans:Coding systems</p>
4	26	<p>Which of the following is a coding system?</p> <p>(a) CATIA (b) Opitz</p> <p>(c) AutoCAD (d) CAM</p> <p>Ans:Opitz</p>
4	27	<p>Opitz system uses how many digits in basic code?</p> <p>(a) 5 (b) 6</p> <p>(c) 9 (d) 3</p> <p>Ans:9</p>
4	28	<p>Which is not a part coding system?</p> <p>(a) MICLASS (b) Opitz</p> <p>(c) CNC (d) CODE</p> <p>Ans:CNC</p>
4	29	<p>GT reduces:</p> <p>(a) Design accuracy (b) Lot size</p> <p>(c) Setup time (d) Tool life</p> <p>Ans:Setup time</p>
4	30	<p>MICLASS system was developed in:</p> <p>(a) Japan (b) Germany</p> <p>(c) USA (d) UK</p> <p>Ans:Germany</p>

UNIT	Q NO	QUESTIONS
4	31	<p>The Opitz system mainly classifies parts based on:</p> <p>(a) Color (b) Geometry (c) Worker type (d) Design software</p> <p>Ans:Geometry</p>
4	32	<p>A secondary code in Opitz system refers to:</p> <p>(a) Shape (b) Tool type (c) Manufacturing method (d) Material property</p> <p>Ans:Manufacturing method</p>
4	33	<p>Which is not a benefit of group technology?</p> <p>(a) Less material waste (b) Faster tool changes (c) Higher training cost (d) Standardization</p> <p>Ans:Higher training cost</p>
4	34	<p>Group layout is also called:</p> <p>(a) Cellular layout (b) Fixed layout (c) Line layout (d) Process layout</p> <p>Ans:Cellular layout</p>
4	35	<p>GT cell is:</p> <p>(a) A software (b) A part of inventory (c) Group of machines for part family (d) A type of tool</p> <p>Ans:Group of machines for part family</p>
4	36	<p>What is the advantage of part families?</p> <p>(a) More complex layout (b) Redundant design (c) Better scheduling (d) Random workflow</p> <p>Ans:Better scheduling</p>
4	37	<p>In GT, coding is done based on:</p> <p>(a) Machine type (b) Material only (c) Shape, size, process (d) Tooling</p> <p>Ans:Shape, size, process</p>
4	38	<p>GT allows:</p> <p>(a) Job shop layout (b) Random scheduling (c) Standardization of parts (d) Increase in defects</p> <p>Ans:Standardization of parts</p>
4	39	<p>Which digit in Opitz shows the length-diameter ratio?</p> <p>(a) 1st (b) 3rd (c) 5th (d) 6th</p> <p>Ans:3rd</p>
4	40	<p>GT helps in:</p> <p>(a) Redundant production (b) Mass customization (c) Low inventory turnover (d) Manual documentation</p> <p>Ans:Mass customization</p>

UNIT	Q NO	QUESTIONS
4	41	The CODE system is developed by: (a) MIT (c) Siemens Ans:CAM-I
4	42	Opitz code describes: (a) Electrical circuits (c) Software commands Ans:Part geometry and features
4	43	Which is NOT a category in Opitz coding? (a) Main shape (c) Material cost Ans:Material cost
4	44	In MICLASS, 'M' refers to: (a) Manufacturing (c) Machine Ans:Manufacturing
4	45	Which GT system is highly detailed and flexible? (a) Opitz (c) CODE Ans:MICLASS
4	46	Group technology can be applied in: (a) Product design (c) Inventory control Ans:All of the above
4	47	Which coding system uses alphanumeric symbols? (a) MICLASS (c) STL Ans:MICLASS
4	48	Which aspect is not considered in part families? (a) Shape (c) Cost Ans:Cost
4	49	Cellular layout leads to: (a) Long lead time (c) Reduced material handling Ans:Reduced material handling
4	50	Which of the following is a disadvantage of GT? (a) Increased productivity (c) Reduced WIP Ans:Higher setup cost initially

UNIT	Q NO	QUESTIONS
5	1	<p>FMS stands for:</p> <p>(a) Flexible Machining Setup (b) Flexible Manufacturing System (c) Fast Manufacturing System (d) Functional Manufacturing Setup</p> <p>Ans:Flexible Machining Setup</p>
5	2	<p>One key benefit of FMS is:</p> <p>(a) Manual labor increase (b) Low flexibility (c) Reduced setup time (d) Slow response to changes</p> <p>Ans:Reduced setup time</p>
5	3	<p>A basic component of FMS is:</p> <p>(a) Welding machine (b) Manual cart (c) CNC machine (d) Hand tool</p> <p>Ans:CNC machine</p>
5	4	<p>FMC stands for:</p> <p>(a) Fixed Manufacturing Cell (b) Flexible Manufacturing Cell (c) Fast Machining Cell (d) Functional Machining Cell</p> <p>Ans:Flexible Manufacturing Cell</p>
5	5	<p>FTC is a type of FMS used in:</p> <p>(a) Injection molding (b) Drilling (c) Turning operations (d) Welding</p> <p>Ans:Turning operations</p>
5	6	<p>FTL stands for:</p> <p>(a) Flexible Transport Layout (b) Flexible Transfer Line (c) Fast Tooling Line (d) Fixed Turning Line</p> <p>Ans: Flexible Transfer Line</p>
5	7	<p>FMS layout types include all except:</p> <p>(a) Inline (b) Loop (c) Ladder (d) Star-shaped</p> <p>Ans:Star-shaped</p>
5	8	<p>Flexible Machining Systems mainly use:</p> <p>(a) Welding robots (b) CNC machines (c) Manual lathes (d) Assembly belts</p> <p>Ans:CNC machines</p>
5	9	<p>A benefit of FMS is:</p> <p>(a) High labor cost (b) Inflexibility (c) High WIP (d) Reduced lead time</p> <p>Ans:Reduced lead time</p>
5	10	<p>In FMS, transport system includes:</p> <p>(a) Human conveyor (b) Manual carts (c) AGVs and conveyors (d) Only forklifts</p> <p>Ans:AGVs and conveyors</p>

UNIT	Q NO	QUESTIONS
5	11	<p>AGV stands for:</p> <p>(a) Automated Guided Vehicle (b) Automatic Gripper Vehicle (c) Auto General Vehicle (d) Assembled Ground Vehicle</p> <p>Ans:Automated Guided Vehicle</p>
5	12	<p>AGVs are used to:</p> <p>(a) Paint surfaces (b) Perform welding (c) Move materials autonomously (d) Inspect parts</p> <p>Ans:Move materials autonomously</p>
5	13	<p>AGVs are guided by:</p> <p>(a) Human operators (b) Paper trails (c) Embedded wires or sensors (d) Chains</p> <p>Ans:Embedded wires or sensors</p>
5	14	<p>Which is NOT a type of AGV?</p> <p>(a) Towing AGV (b) Unit load AGV (c) Robotic arm (d) Forklift AGV</p> <p>Ans:Robotic arm</p>
5	15	<p>AGV improves:</p> <p>(a) Fuel consumption (b) Labor requirement (c) Material handling efficiency (d) Casting speed</p> <p>Ans:Material handling efficiency</p>
5	16	<p>AGV works on the principle of:</p> <p>(a) Path following using sensors (b) Free roaming (c) Magnetic repulsion (d) Internal combustion</p> <p>Ans:Path following using sensors</p>
5	17	<p>Which of the following is a component of FMS?</p> <p>(a) Manual grinder (b) Material handling system (c) Typewriter (d) Overhead projector</p> <p>Ans:Material handling system</p>
5	18	<p>Loop layout in FMS allows:</p> <p>(a) One-directional flow (b) Zigzag flow (c) Star topology (d) Circular part assembly</p> <p>Ans:One-directional flow</p>
5	19	<p>Which is NOT an advantage of FMS?</p> <p>(a) Higher flexibility (b) Reduced throughput (c) Better quality control (d) Higher machine utilization</p> <p>Ans:Reduced throughput</p>
5	20	<p>Which is a storage system in FMS?</p> <p>(a) AGV (b) AS/RS (c) Milling machine (d) Welding robot</p> <p>Ans:AS/RS</p>

UNIT	Q NO	QUESTIONS
5	21	<p>A robot is defined as:</p> <p>(a) Manual tool (b) Programmable mechanical device</p> <p>(c) Static fixture (d) Mobile phone</p> <p>Ans:Programmable mechanical device</p>
5	22	<p>Which is a type of robot configuration?</p> <p>(a) Cuboidal (b) Cylindrical</p> <p>(c) Trapezoidal (d) Circular</p> <p>Ans:Cylindrical</p>
5	23	<p>Which robot configuration has three linear axes?</p> <p>(a) SCARA (b) Cartesian</p> <p>(c) Spherical (d) Cylindrical</p> <p>Ans:Cartesian</p>
5	24	<p>Robot motion includes:</p> <p>(a) Translational (b) Rotational</p> <p>(c) Both A and B (d) None</p> <p>Ans:Both A and B</p>
5	25	<p>Degrees of freedom in robots refer to:</p> <p>(a) Number of tasks (b) Number of joints/movements</p> <p>(c) Programming languages (d) Accuracy</p> <p>Ans:Number of joints/movements</p>
5	26	<p>SCARA robots are best suited for:</p> <p>(a) Spray painting (b) Pick and place tasks</p> <p>(c) Welding (d) Drilling</p> <p>Ans:Pick and place tasks</p>
5	27	<p>Which is NOT a robot programming method?</p> <p>(a) Teach pendant (b) Offline programming</p> <p>(c) Telepathy (d) Lead-through</p> <p>Ans:Telepathy</p>
5	28	<p>Sensors in robots help in:</p> <p>(a) Movement (b) Sensing environment</p> <p>(c) Programming (d) Designing</p> <p>Ans:Sensing environment</p>
5	29	<p>Which is a type of end effector?</p> <p>(a) Lathe (b) Gripper</p> <p>(c) Fixture (d) Clamp</p> <p>Ans:Gripper</p>
5	30	<p>Vacuum grippers work by:</p> <p>(a) Clamping (b) Suction</p> <p>(c) Electric arc (d) Friction</p> <p>Ans:Suction</p>

UNIT	Q NO	QUESTIONS
5	31	<p>Mechanical grippers use:</p> <p>(a) Magnetic force (b) Compressed air</p> <p>(c) Finger-like jaws (d) Vibration</p> <p>Ans:Finger-like jaws</p>
5	32	<p>Which sensor is used for obstacle detection?</p> <p>(a) Proximity sensor (b) Heat sensor</p> <p>(c) Humidity sensor (d) Vibration sensor</p> <p>Ans:Proximity sensor</p>
5	33	<p>End effectors are mounted on the robot's:</p> <p>(a) Base (b) Wrist</p> <p>(c) Elbow (d) Control panel</p> <p>Ans:Wrist</p>
5	34	<p>Which is an industrial application of robots?</p> <p>(a) Packaging (b) Welding</p> <p>(c) Assembly (d) All of the above</p> <p>Ans:All of the above</p>
5	35	<p>Robot motion is controlled through:</p> <p>(a) AI chip (b) Servo motors</p> <p>(c) Fan (d) Timer</p> <p>Ans:Servo motors</p>
5	36	<p>A teach pendant is used for:</p> <p>(a) Machining (b) Programming the robot</p> <p>(c) Painting (d) Heating</p> <p>Ans:Programming the robot</p>
5	37	<p>Welding robots increase:</p> <p>(a) Inaccuracy (b) Productivity</p> <p>(c) Cost (d) Manual workload</p> <p>Ans:Productivity</p>
5	38	<p>Robots are best used in environments that are:</p> <p>(a) Clean (b) Human-operated</p> <p>(c) Hazardous (d) Dust-free</p> <p>Ans:Hazardous</p>
5	39	<p>Which is a disadvantage of robots?</p> <p>(a) Speed (b) Initial cost</p> <p>(c) Accuracy (d) Repeatability</p> <p>Ans:Initial cost</p>
5	40	<p>Spray painting robots provide:</p> <p>(a) Uneven coating (b) Consistent quality</p> <p>(c) Manual tracking (d) Hand finishing</p> <p>Ans:Consistent quality</p>

UNIT	Q NO	QUESTIONS
5	41	<p>Inspection robots help in:</p> <p>(a) Assembly (b) Quality checking</p> <p>(c) Heating (d) Welding</p> <p>Ans:Quality checking</p>
5	42	<p>Robots can perform assembly operations:</p> <p>(a) Once only (b) Slowly</p> <p>(c) Repeatedly and precisely (d) Randomly</p> <p>Ans:Repeatedly and precisely</p>
5	43	<p>Which gripper is used for fragile items?</p> <p>(a) Magnetic (b) Vacuum</p> <p>(c) Mechanical (d) Hydraulic</p> <p>Ans:Vacuum</p>
5	44	<p>Which programming language is often used in robot programming?</p> <p>(a) Python (b) HTML</p> <p>(c) CSS (d) MS Word</p> <p>Ans:Python</p>
5	45	<p>Which robot configuration resembles a human arm?</p> <p>(a) Cartesian (b) Cylindrical</p> <p>(c) Articulated (d) SCARA</p> <p>Ans:Articulated</p>
5	46	<p>Robots reduce:</p> <p>(a) Quality (b) Human safety</p> <p>(c) Downtime (d) Efficiency</p> <p>Ans:Downtime</p>
5	47	<p>What does SCARA stand for?</p> <p>(a) Selective Compliance Assembly Robot Arm (b) Static Configuration Arm</p> <p>(c) Speedy Controlled Arm (d) Semi-Coded Arm Robot</p> <p>Ans:Selective Compliance Assembly Robot Arm</p>
5	48	<p>The wrist of the robot provides:</p> <p>(a) Lifting (b) Orientation control</p> <p>(c) Programming (d) Clamping</p> <p>Ans:Orientation control</p>
5	49	<p>Which is NOT a robot configuration?</p> <p>(a) Cylindrical (b) Articulated</p> <p>(c) Trapezoidal (d) Spherical</p> <p>Ans:Trapezoidal</p>
5	50	<p>Main advantage of robotic sensors:</p> <p>(a) Decoration (b) Enhances human safety</p> <p>(c) Coloring (d) Rotation</p> <p>Ans:Enhances human safety</p>

UNIT – 1

PART B (Short answer questions each question carries 3 marks)

- 1 Discuss the importance of CAD in modern product design.
- 2 Describe Shigley's design process with steps.
- 3 Describe any three CAD activities.
- 4 List any three benefits of CAD.
- 5 Differentiate between a CAD workstation and a normal PC.
- 6 Why are graphics standards needed in CAD systems?
- 7 Write about IGES and DXF in data exchange.
- 8 Discuss the development of FEA.
- 9 List the advantages of DFMA.
- 10 Differentiate between Sequential Engineering and Concurrent Engineering.

UNIT – II

PART B (Short answer questions each question carries 3 marks)

- 11 Write about the functions of CAM in detail.
- 12 Discuss the benefits of CAM.
- 13 Describe the concept and importance of CIM.
- 14 Write about the evolution of CIM.
- 15 Draw the CIM wheel.
- 16 Discuss integrated CAD/CAM and its applications.
- 17 Compare Variant type and Generative type CAPP.
- 18 Describe the Computer Integrated Production Management system.
- 19 Describe Capacity Planning and Materials Requirement Planning (MRP).
- 20 Discuss Just In Time (JIT) and its significance in manufacturing.

UNIT – III

PART B (Short answer questions each question carries 3 marks)

- 21 Discuss the features of CNC machines .
- 22 Discuss the working principle of CNC system.
- 23 Describe the types of turning centres with examples.
- 24 Describe the types of machining centers: horizontal, vertical, and universal.
- 25 Write about machine axis conventions with a diagram.
- 26 Discuss the maintenance practices of CNC machines.
- 27 Enumerate the different types of drives used in CNC machines.
- 28 Describe feedback devices like encoders and transducers.
- 29 Describe the working of ATC and tool magazine in CNC machines.
- 30 Discuss the role of in-process probing in CNC machining.

UNIT – IV

PART B (Short answer questions each question carries **3 marks**)

- 31 Enumerate the classification of RP processes with examples.
- 32 Differentiate between subtractive and additive RP methods.
- 33 Write short notes on advantages and applications of RP.
- 34 Discuss the materials used in Rapid Prototyping.
- 35 Describe the principle of Stereolithography (STL).
- 36 Describe Fused Deposition Modelling (FDM) process.
- 37 Write about Selective Laser Sintering (SLS).
- 38 Discuss 3D Printing in Rapid Prototyping.
- 39 Write short notes on Rapid Tooling.
- 40 Compare Opitz, MICLASS and CODE systems of Group Technology.

UNIT – V

PART B (Short answer questions each question carries **3 marks**)

- 41 Write about the components of FMS.
- 42 Discuss different FMS layouts.
- 43 Compare FMC, FTC, FTL and FMS.
- 44 State the benefits of FMS.
- 45 Write about the working principle of AGV.
- 46 Discuss the types and benefits of AGV.
- 47 Write about robot configurations and basic motions.
- 48 Describe robot programming methods.
- 49 Discuss end effectors: mechanical and vacuum grippers.
- 50 Discuss industrial applications of robots (welding, assembly, inspection).

UNIT – I

PART C (Each question carries **10 marks**)

- 1 Explain Shigley's design process in detail with a neat flow diagram
- 2 Describe the components of a CAD workstation and explain different CAD software packages with examples.
- 3 Explain the need for graphics standards in CAD systems. Discuss GKS, IGES, and DXF standards with their features and applications.
- 4 Explain the step-by-step procedure involved in carrying out a finite element analysis.
- 5 Explain the guidelines of Design for Manufacturing and Assembly (DFMA).

UNIT – II

PART C (Each question carries 10 marks)

- 6 Explain the functions of CAM and discuss the benefits of CAM in modern manufacturing industries.
- 7 Explain Material Requirement planning with a neat flow diagram.
- 8 Explain the integration of CAD and CAM systems.
- 9 Explain the types of CAPP system.
- 10 Explain Shop Floor Control (SFC) system with a neat flow diagram.

UNIT – III

PART C (Each question carries 10 marks)

- 11 Explain the working principle of a CNC system with a neat block diagram.
- 12 Explain the types of machining centers (horizontal spindle, vertical spindle, and universal machines) with suitable sketches.
- 13 Discuss the maintenance requirements of CNC machines and explain the importance of preventive maintenance.
- 14 Explain the various drives used in CNC machines.
- 15 Explain the following mechanical and control components of CNC machines.(a)Recirculating ball screw (b)Feedback devices

UNIT – IV

PART C (Each question carries 10 marks)

- 16 Explain the working principle of Stereolithography process with a neat sketch.
- 17 Discuss the classification of rapid prototyping processes
- 18 Explain the Selective Laser Sintering (SLS) process with a neat sketch.
- 19 Explain the concept of part families. Describe the methods of parts classification and coding used in Group Technology.
- 20 Explain MICLASS coding system with an example.

UNIT – V

PART C *(Each question carries 10 marks)*

- 21 Explain the major components of a Flexible Manufacturing System (FMS).
- 22 Explain different FMS layouts with neat sketch.
- 23 Explain the working principle of AGV and discuss its types.
- 24 Explain various robot configurations with neat sketch.
- 25 Discuss the role of industrial robots in manufacturing applications such as material handling, assembly and inspection.