ME8691 COMPUTER AIDED DESIGN AND MANUFACTURING
QUESTION BANK
UNIT-1
PART - A

1.Define Product cycle.

2 List out the various stages in the life cycle of a product.

3 Differentiate preliminary design and detailed design.

4 What is design process ? Mention the steps involved in shigley's Model
for the design process.

5 What do you mean by synthesis of design?

6 What are the benefits of concurrent engineering?

7 Write short notes on sequential engineering.

8 Mention any four applications of computer aided design in mechanical
engineering.

9 Define computer graphics and write any two computer graphics
applications.

10 List the fundamental reasons for implementing a CAD system.

11 What is Rendering?

12 What is homogeneous coordinates?

13 What is meant by viewport and windowing.

14 List and differentiate the types of 2D geometric transformations.

15 Rewrite about concatenation transformation.

16 What is the difference between CAD/CAM and CIM?

17.What are types the production systems?

18 What are manufacturing metrics?

19 What is 2D and 3D transformations.(NOV 2015).

20.Distinguish between translation and scaling

PART B (13 Marks)

1 (i) With a block diagram ,explain the different phase of design and manufacturing process.

(ii) What is meant by concurrent engineering? Describe the various schemes for concurrent engineering.

2 List down the 2D transformation matrix for the following transformation processes.

(i) Translation (ii) Scaling (iii) Rotation (iv) Shearing

3 Describe homogeneous coordinate transformation system and matrix.

4 (i) Deduce windowing and viewing transformation matrix parametrically.

(ii) What do you mean by composite transformation? How is it useful?

5 (i) Discuss with suitable example, the various activities involved in generic product development process.

(ii)Draw and explain the CAD system architecture.

6 (i) Describe the role of computer in CAD? Draw flow diagram of CAD,

(ii)Write their benefits and engineering applications of CAD.

7 (i) Compare sequential and simultaneous engineering.

(ii) Explain the techniques involved in line drawing algorithm.

8 Explain various two dimensional display control facilities in computer graphics.

9 Find the transformation matrix to transform the given matrix ABCD to three fourth of its size with centre still remaining at the same position. The coordinates of the rectangle are A(2,3),B(6,3),C(6,6),D(2,6) and its centre at (4,4.5). Also find the resultant coordinates of the given rectangle.

10 Write short note on the following items. (i) Line Drawing (ii) Digital Differential Analyzer Algorithm (iii) Bresenham's Line Algorithm.

11 Write short note on the following items. (i) Clipping (ii) Normalized Transformation

(iii) Workstation Transformation.

12 (i) Explain CAD/CAM interface. (ii) Classify the production system. compare and contrast the characteristics of each of them.

13 What are manufacturing metrics and explain commonly used production performance measures.

14 List the various manufacturing planning and manufacturing control applications of CAM.

PART C (15 Marks)

1 Analyze the use of clipping algorithm in the design .Explain one of the line clipping algorithm in details.

2 A triangle has coordinates with A(5,2),B(3,5) and C (7,5).

(i) First rotate the triangle by 300 about the origin and then translate the triangle 2 units in X direction and 2 units in Y direction.

(ii) Then translate the triangle 2 units in X direction and 2 units in Y direction and then rotate by 300 about the origin. Obtain the resultant coordinates for both cases and write your inferences.

3 What are the differences between the sequential approach to the product development process and the concurrent engineering approach? Why should the latter be adopted?

4 The average part produced in a batch manufacturing plant must be processed sequentially through six machines on average .Twenty new batches of parts are launched each week. Average operations time = 6 min,average set up time =5 hours, average batch size =36 parts and average non-operation time per batch = 10 hrs/machine. There are 18 machines in the plant working in parallel. Each of the machine can be set up for any type of job processed in the plant. The plant operates an average of 70 production hours per week. scrap rate is negligible. Determine manufacturing lead time for an average part, plant capacity and plant utilization.

UNIT II GEOMETRIC MODELING
PART A (2 Marks)

1 Define curve and free form curve.

2 Write the equation of a circle in parametric form.

3. List out the various Bezier curves based on control points.

4 Write down the difference between Hermite curve and Bezier curve.

5 Mention any four characteristics of Bezier curves.

6 List the types of parametric Bi-cubic Surface used in CAD.

7 State the limitations of B - Spline curve.

8 Discuss the various types of surfaces.

9 Illustrate the common surface entities used in a surface modeling.

10 Discuss how coon's surfaces are generated.

11 Distinguish between analytical curve and synthetic curve.

12 Show the applications of surface modeling.

13 Mention any two advantages and disadvantages of surface modeling.

14 Differentiate between interpolated curves and approximated curves.

15 What is the use of surface patch?

16 Differentiate the advantages and disadvantages of Bezier surface.

17 Define geometrical modeling.

18 Mention the advantages and disadvantages of CSG.

19 List the main advantages and drawback of wireframe modeling.

20 Why B-rep modelling approaches are widely followed than CSG approach?

PART B (13 Marks)

1 (i) Write short notes on parametric representation of synthetic surfaces.

(ii) Write short notes on order of continuity.

2 (i) Describe the representation of curves.

(ii) Find the shape of cubic spline curve if the result is (a) $P0 = P1$ and $P'1=P0$ (b) $P0=P1$ and $P1'= -P0'$.

3.Derive the transformation matrix for a Hermite curve. (

4 Elaborate about the Bezier curves with neat sketches and also explain how cubic Bezier curves can be modified.

5 (i) What is B-Spline curve? Also explain it.

(ii) Discuss the matrix formulation in cubic B-Spline curves.

6 What is surface modelling? Discuss the various types of it and state the applications of surface modeling.

7 (i) Write short notes on Surface Patch.

(ii) Discuss about coons surface.

8 (i) Write short notes on Bicubic surface patches.

(ii) Elaborately discuss about rational curves.

9 Briefly discuss about the Bezier surface and composite surface.

10 Explain surface modeling and discuss the various types of it, Give the advantages, disadvantages and applications of surface modeling.

11 Explain constructive solid geometry technique. What is the role of primitive and Boolean operations in CSG? Explain with suitable examples.

12 What do you understand by Boundary representation (B-rep) technique of solid modeling? Explain the data structure of B-rep solid Model.

13 How does solid modeling differ from surface modeling? With neat sketch discuss briefly about B-rep type of solid modeling techniques.

14 Explain with sketch and construction tree involved in Boolean operation?

PART C (15 Marks)

1 Describe the characteristics of Bezier curve with the control points, the order of continuity and What do you understand by blending function.

2 Distinguish between geometry and topology used in design of objects, Explain the primitive approach and the features approach, discuss various solid entities in solid models.

3 Take two solid objects of your choices and with the help of neat diagrams, explain various Boolean operations.

4 (i) Write short notes on characteristics of the B-Spline curves.

(ii) Name the controlling points for generating curves.

UNIT III CAD STANDARDS

PART A (2 Marks)

1 What are CAD standards and its need?

2 List out the international organizations involved to develop the graphics standards.

3 What is GKS cell array?

4 What is the objective of GKS-3D standard?

5 Name the various interface standards at different levels.

6 What is the need of data exchange?

7 Give the types of graphics standard.

8 Write any four data exchange formats.

9 Classify GKS and sketch the layer model of GKS.

10 Compare PHIGS and IGES.

11 Illustrate the various features of PHIGS.

12 Write short notes on Open Graphics library.

13 Show the limitations of IGES and DXF

14 Point out the features of NAPLPS.

15 Tabulate the basic sections in DXE File format.

16 Obtain a sketch for three layered architecture for product data exchange.

17 Assess the various file section in IGES.

18 Draw the three layer architecture of STEP.

19 Create the flow diagram to communicate between two CAD systems using IGES.

20 Discuss the advantage of open graphics library.

PART B (13 Marks)

1 (i)Define Graphics Keneral System. Explain briefly with suitable examples.

(ii)Examine IGES data exchange format.

2 Describe the data exchange standard and development in data exchange format**.**

3 (i) Write short notes on data base management.

(ii) Identify the thrust involved in developing CAD standards.

4 (i)Describe PHIGS.

(ii)Show how data is exchanged between two cad systems.

5 (i) Summarize the standards for exchanging images.

(ii) Discuss about open graphics library.

6 (i) Describe (1) Local area network (2) Wide area network.

(ii)Describe Standard for the Exchange of product model Data (STEP) in detail.

7 (i) Describe the types of Graphics Standards.

(ii)Discuss the two basic items of GKS such as primitives and attributes.

8 (i).Examine the features of open GL.

(ii).Illustrate (1) Direct CAD system Export (2) Direct Translation software (3) Neutral data exchange format.

9 Classify the Neutral file formats and Explain in detail. (13) BT6 Creating

10 Analyze Continuous acquisition and life cycle support and elaborate their types.

11 Explain Product Data Exchange standard and draw the three layer architecture of PDES.

12 Infer the different levels of graphics standard communication and elaborate each of them.

13 (i) Explain drawing exchange format (DXF).

(ii) Compare IGES and STEP.

14 Elaborate (i) HTML (ii) VRML (iii) CGM (iv) BITMAPS(v) Computer Aided Design Interface.

PART C

1.Explain the following polyhedral object using b-rep elements and verify the Euler equation for the same (i) simple polyhedra. (ii) Polyhedral object a face may have loops. (iii) Objects with holes that do not go through the entire object. (iv) Objects have holes that go through entire objects.

2 Evaluate the various testing methods of IGES processors.

3 Formulate different STEP architecture with neat sketch and justify the suitable one for graphics standard.

4 List and explain the basic requirements and principles of communication protocol.

UNIT- IV FUNDAMENTAL OF CNC AND PART PROGRAMING
PART A (2 Marks)

1 Mention the points to be considered while designing of CNC tooling.

2 List the features of NC part programming.

3 State the advantages of integrating computer with NC machine tools.

4 Mention the various problems with conventional NC machines.

5 Name the methods of specifying the zero point.

6 Enumerate about linear bearings.

7 State the advantages of incremental positioning.

8 List the elements of NC system.

9 Name the various elements of CNCmachines.

10 Distinguish between open and closed loop system.

11 Draw the simple configuration of CNC.

12 Classify CNC systems**.**

13 Distinguish NC and CNC systems.

14 Why re-circulating screws are used in CNC machines?

15 Differentiate machine reference and tool reference point.

16 Give the general form of a program line.

17 Point out the importance of tool magazine in CNC machine.

18 Define preset tooling.

19 Write a note on canned cycle.

20 Define Subroutine.

PART B (13 Marks)

1 (i) Describe the design considerations of NC machines, which are essential for proper functioning.

(ii) Discuss about slide ways used in CNC machine tools, for various applications.

2 (i) Describe 2D and 3D machining in CNC machines with a suitable example.

(ii) With a neat sketch, explain the working of ATC.

3 (i) Describe about spindles used in CNC machine tools.

(ii) Describe the functions of feed drives. Also state the requirement of the drives in CNC machine tools.

4 Explain the following in CNC machining.

(i) Linear interpolation

(ii) Circular interpolation

(iii) Cubic interpolation

5 Write the part program for the part shown below.

6 Explain the main difference between point to point and continuous path of numerically controlled machine tools, with a specific example.

7 Explain the various elements of NC machine with closed loop control system and its implications on NC control.

8 Discuss the advantages of computer numerical control system. What is the difference between positioning machines and contouring machines? State a few typical applications where the use of numerical control would be justified.

(9 (i) Describe the spindle heads used in CNC machines and list out their merits.

(ii) List the difference between manual and computer assisted part programming.

10 Write the part program for drilling holes in the part shown below. the plate thickness is 20mm.

12. Describe in detail about macros and give the programming structure in macros.

13. Describe in detail about CATIA, CAM work and Bob CAD CAM. Also mention the merits and demerits of each package.

PART C

1. Evaluate the following functions in CNC machining.

(i) M codes and G codes (5)

(ii) Program sheet (5)

(iii) Canned cycle (5)

2. Compare the hydraulic and pneumatic drives in CNC machining and evaluate the outcome.

UNIT V CELLULAR MANUFACTURING AND FLEXIBLE MANUFACTURING SYSTEM
PART A (2 Marks)

1 Define group technology.

2 List the roles of group technology in CAD/CAM integration.

3 Compare monocode with polycode.

4 Define part family.

5 List the coding systems that are successfully implemented in industries

6 6 What are theadvantages of group Technology?

7 Define composite part.

8 Distinguish the steps involved in production flow analysis.

9 Mention the three basic code structure used in GT application.

10 Define cellular manufacturing.

11 List the components of FMS.

12 Define flexible manufacturing system.

13 Identify any four functions of the material handling systems in a FMS.

14 Name the different types of layout configuration prevalent in FMSs.

15 Differentiate between primary and secondary material handling systems.

16 What is meant by AGV and write its components?

17 Summarize some of the functions of a FMS computer system.

18 Classify FMS based on number of machines.

19 List the FMS layout configurations.

20 Mention the different types of data files required for a FMS.

PART B (13 Marks)

1 (a) List the various benefits of implementing a GT in a firm. Also bring out the advantages and limitation of using GT.

(b) Discuss the ways to identify the part families.

2 Describe about group technology. Also explain why GT is important in achieving CAD and CAM integration.

3 (a) State the criteria used for cell design.

(b) Enumerate on the parts classification and coding system and its features.

4 Explain the various machine cells and layouts in used industries.

5 Summarize how group technology is used in designing manufacturing cells.

7 Discuss about (i) Composite part concept (ii) Key machine concept

8 a) List the major components of an FMS. Explain them in brief.

(b) Describe the various workstations of FMS.

9 (a) Discuss the various aspects of FMS layout configurations

(b) Interpret the various functions that are performed by the FMS computer control system.

10 Examine flexible manufacturing system. In what ways, FMS differs from other manufacturing systems.

11 (a) List the functions of the material handling system in a FMS.

(b) Explain the applications, advantages and disadvantages of a FMS.

12 Summarize with suitable sketches, explain the various FMS layout configurations prevalent today.

13 (a) Show distinguishing facts between FMS and FMC.

(b) Distinguishing facts between Dedicated FMS and Random- order FMS.

14 (a) Discuss the important of In-process monitoring of work piece quality in FMS.

(b) Express how is tool life monitored in FMS.

PART C (15 Marks)

1 Evaluate the Vehicle Guided Technology and guidance method in detail with their advantages and disadvantages.

2 Write a case study on automated storage and retrieval system (AS/RS) used in industries.

3 Enumerate on the vehicle management system & vehicle safety deployed in the material handling system of the FMS.

4 Explain the main FMS operational issues to be considered and What types of quantitative analysis may be used with regard to FMS.

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