Course Code: 1960326 **Roll No:** **MLRS-R19**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

III B.Tech II Sem Regular End Examination, June 2022

CAD/CAM

(Mechanical Engineering)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	List the reasons for adopting CAD in an engineering organization.	2M	CO1	BL1
	b)	What are the limitations found in the general wireframe modelling systems?	2M	CO1	BL1
	c)	Write down the characteristics of surface models.	2M	CO2	BL1
	d)	Enumerate the steps to construct model by using CSG primitives	2M	CO2	BL1
	e)	What is the difference between NC and CNC?	2M	CO3	BL1
	f)	Give the functioning of any two G code used in CNC programming.	2M	CO3	BL1
	g)	Write down the various activities in process planning.	2M	CO4	BL1
	h)	Mention the advantages to be gained by the adoption of group-technology methods.	2M	CO4	BL1
	i)	What do you understand by the term flexibility in FMS?	2M	CO5	BL2
	j)	Define the terms precision and accuracy?	2M	CO5	BL1

PART- B

(10*5 Marks = 50 Marks)

2	a)	Explain the functionalities expected of a graphic database structure	5M	CO1	BL2
	b)	Differentiate between classical design and computer aided design process.	5M	CO1	BL2
		OR			
3		Find the equation of a Bézier curve which is defined by the four control points as (80, 30), (100, 100), (200, 100), and (250, 30). Also test the properties of this curve.	10M	CO1	BL3
4	a)	Differentiate between the analytic surfaces and synthetic surfaces with suitable examples.	5M	CO2	BL3
	b)	Discuss the feature of segmentation as a part of surface manipulation technique.	5M	CO2	BL2
		OR			
5		Briefly explain and compare the following modeling techniques: Cell decomposition and boundary representation (B-rep.).	10M	CO2	BL2

6	a)	Describe in detail about the various steps involved in the development of a part program in NC machining	5M	CO3	BL1
	b)	How do you set the tool offsets in case of turning centres? Explain with an example.	5M	CO3	BL2
		OR			
7		The component to be machined is shown in figure 1. Write a part program manually to drill all the holes. What are the advantages that can be obtained if canned cycle approach is used?	10M	CO3	BL3

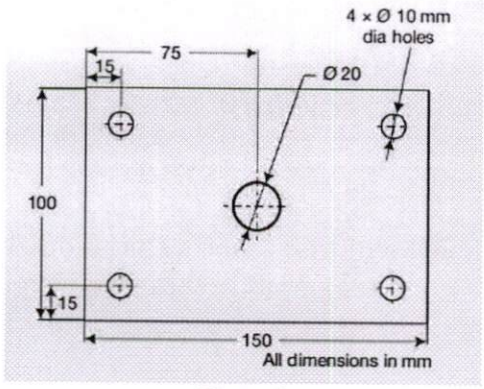

Figure 1

8	a)	What is computer aided process planning? Discuss generative type process planning in detail with an example.	5M	CO4	BL1
	b)	Give a brief description of capacity planning in a manufacturing organization.	5M	CO4	BL1
		OR			
9		Explain the Optiz coding system generally used in group technology. Apply this coding system to develop the form code for rotational components for the component shown in figure 2.	10M	CO4	BL3

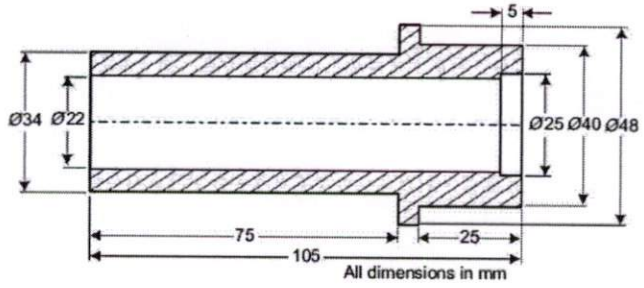

Figure 2

10	a)	Explain about the integration of Computer Aided Quality Control (CAQC) with CAD/CAM.	5M	CO5	BL2
	b)	What are the basic components of a Computer Integrated Manufacturing (CIM) system?	5M	CO5	BL1
		OR			
11		With neat sketch explain the working principle of Coordinate Measuring Machine (CMM) used for contact inspection of machine parts.	10M	CO5	BL1

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EXAMINATION BRANCH

Academic Year	2021-22
Year & Semester	III & II Sem
Regulation	MLRS-R-19
Branch	Mechanical
Course Code	1960326
Course Name	CAD/CAM
Course Faculty's	Dr. G. Surya Prakash
Course Moderator	Dr. G. Surya Prakash
Date of Exam	17-06-2022
Reporting Time & Sign	8:35 AM G.Sprakash

KEY PAPER

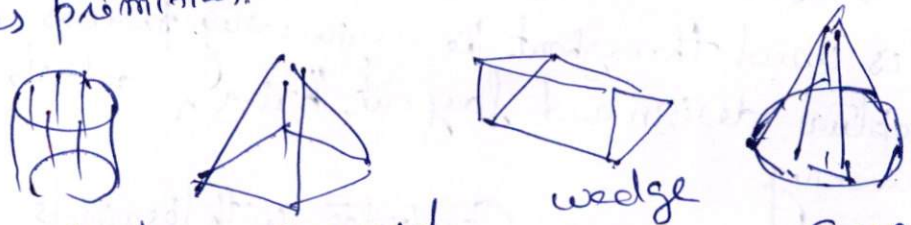
QNO	ANSWER	MARKS
D a	With an increase in need for quality manufacturing along the factors of short-lead time and short product-lives and increasing consumer awareness regarding the quality of product. CAD is used to design and develop products. CAD is used throughout the engineering process Conceptual design and lay out, through detailed engineering. CAD Systems use a Computer with terminals Video monitoring and interactive graphics	2M
b	Limitations of wireframe model:- These types of models are drawn using lines and curves by connecting them their points coordinates or vertices. Though it represents the simple way of 3D representation	2M.

QNO	ANSWER	MARKS

but it very difficulty to under stand and visulise the 3D model with such representation.

c) Surface Model:-
In Surface models, the surfaces are created by connecting together lines and instead of joining only vertices to create lines/curves. with this technique, an external shape of the model can only be obtained and no information about internal shape can be accessed. 2 M

d) CSG Primitives. The best method for 3-D is the Solid construction is the Solid modelling technique, often called primitive instancing or Constructive Solid geometry (CSG). In this a number of 3-D solids are provided as primities. 2



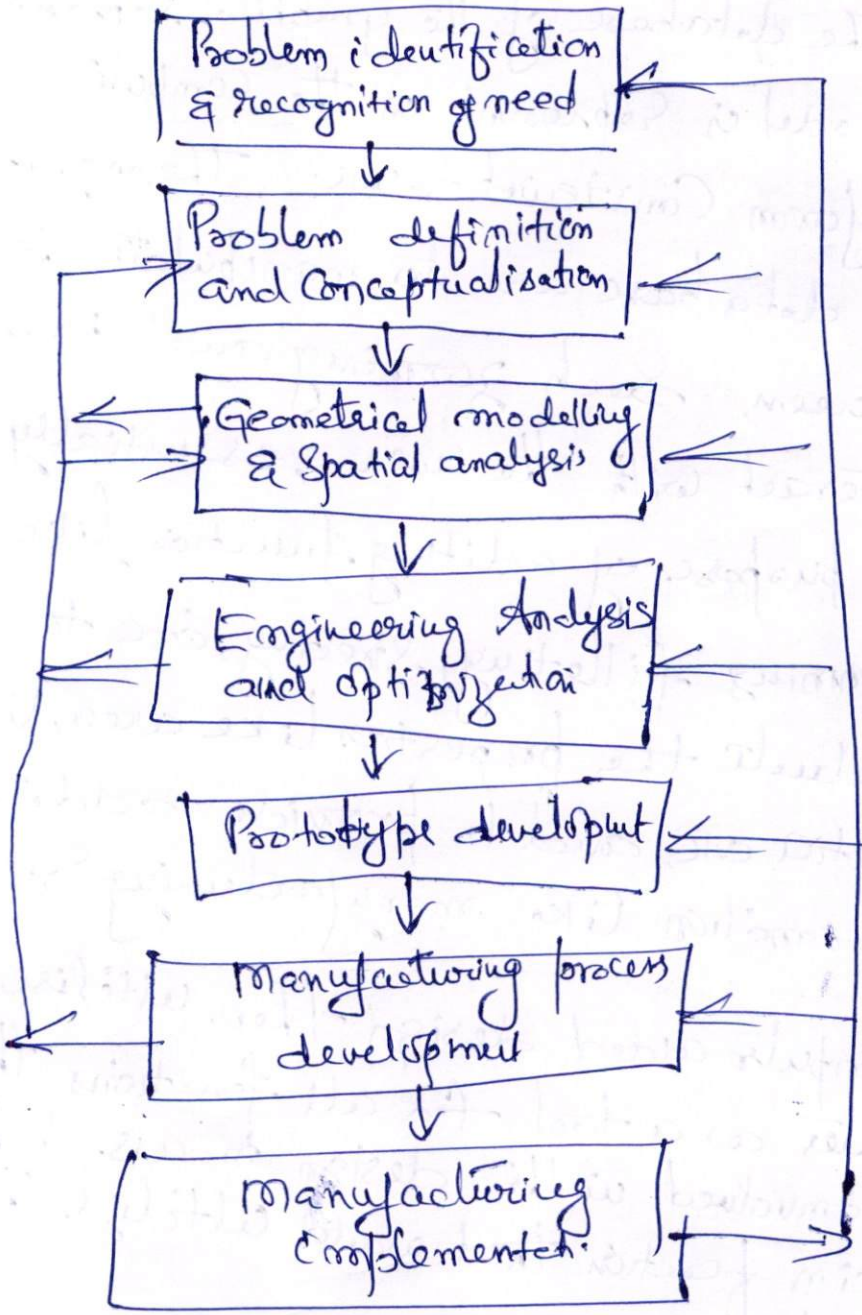
e) NC Machine:- Def:- as a method of automation in which various functions of machine controlled by letters, numbers and symbols

QNO	ANSWER	MARKS
	The introduction of CNC machines radically changed the manufacturing industry. Curves are as easy to cut as straight lines, Complex 3-D sketches are relatively easy	2 M
f)	G-Codes :-	
	Modal Code :- Modal codes are those codes which remain active in the program	
	Non-Modal code :- A Non-modal code will be active only in one block.	
	Ex:- G02, G01 are modal codes	
	G04 - non-modal code.	
	G00 - rapid G01 - Line interpolation G02 - Circular interpolation	
g)	Process Planning :- How make product & its parts what type of equipment & tooling are required to fabricate the parts & assemble the product	2

QNO	ANSWER	MARKS
h)	**Group Technology:-** Group technology is a manufacturing technology philosophy in which similar parts are grouped together to take an advantage of their similarities in design & production	2M
(i)	**Flexible Manufacturing System:-** FMS is a system dealing with group of machining stations (CNC, CNC m/c tools) and automated material handling system using Computer Controlled machines	
j)	**Precision & Accuracy:-** Accuracy is the degree of to which a measured or moment in a space conforms to a system Precision:- Repeatability of a measurement or action without generating random errors	

QNO	ANSWER	MARKS
2) (a)	The database of the graphical representation of model is represent on the computer system in a form convienet to use. The major function of a data base are to manipulate the data on screen, such zooming and panning. to interact with the user, essentially for the purpose of editing function like trimming filleting, stretching, etc to evaluate the properties like area, volumes inertia etc, and to provide additional information like manufacturing syste	5M
5)	Computer aided design that utilises the computer as a tool for all functions that are involved in the design process. The main function that would utilize the Computer (a) ~~Layout design~~	

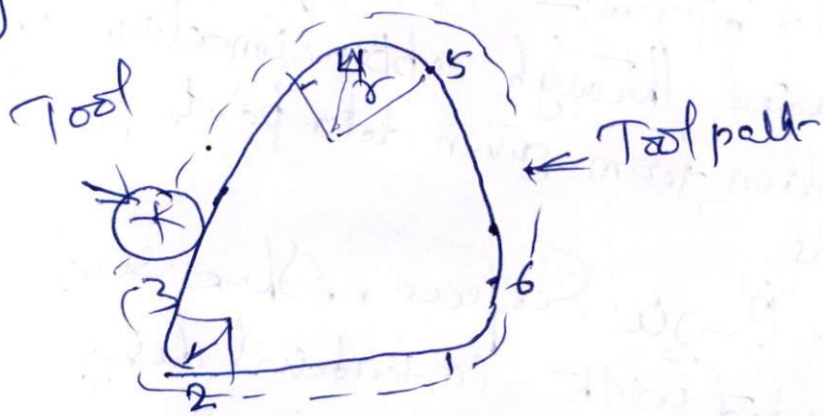
QNO	ANSWER	MARKS



Classical design

5M

QNO	ANSWER	MARKS
4	Analytical Surfaces & Synthetic Surfaces Surfaces are categorized in no. of forms. The surface may be represented as analytical or Synthetic surface. Analytical form:- A surface for which the standard analytical equations available Eg:- A plane is a simplest type of analytical Curve. Ruled surface, Surface of revolution etc. Synthetic form:- A surface, which can be generated through approximation or interpolation from given data points geometric Conditions Ex:- Bazie Surface. The surface are generated with interactive design These surfaces are called free-form surface because of their flexibility.	5M

QNO	ANSWER	MARKS
5	Post-processor:- is seperate Computer program that has been written to prepare the punched tape for specific machine tool. In order to machine profiles with a sufficient degree of accuracy, a very large no. of coordinates need to be determined and fed into the MCU. In milling a straight line parallel axis to any axis, it is only necessary to specify the coordinates of the beginning and end points of the line & feed rate  	5M

QNO	ANSWER	MARKS

6a) NC Part program

Computer assisted part-program Consist of a following steps (i) input translation
(ii) Arithmetic Calculations
(iii) Cut off Set Computation
(iv) Post-processor

Input translation :- The input translation converts coded instructions contained in the program into Computer usable form, prepare to further processing

Arithmetic Calculation :- The arithmetic Calculations unit of the System Consist of a Comprehensive Set of Sub-routine for solving the mathematic required to generate the part-surface

Cutter off Set Computation :- The purpose of Cutter-off Set putations is to set off the Cutter-off toolpath from desired part-surface by the reading the cutter

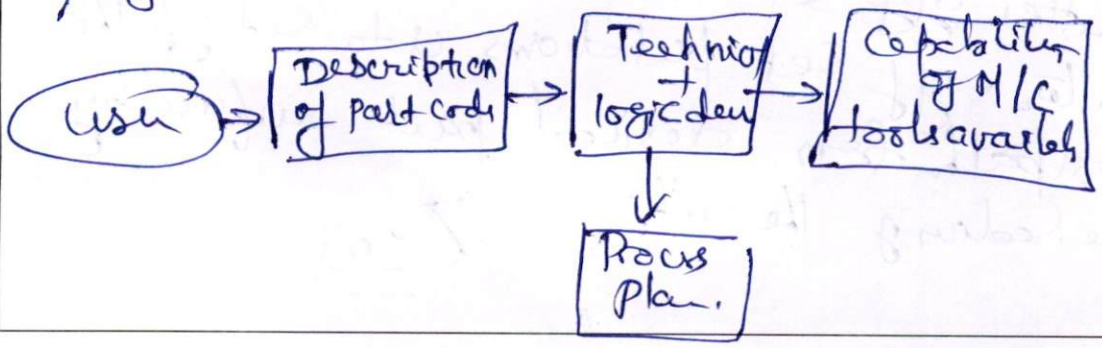
QNO	ANSWER	MARKS

8 a) Computer Aided Process Planning:

CAPP is a power tool for efficient planning and scheduling manufacturing process. It is particularly effective in small volumes, high variety of part production requiring machining, forming & assembly operations

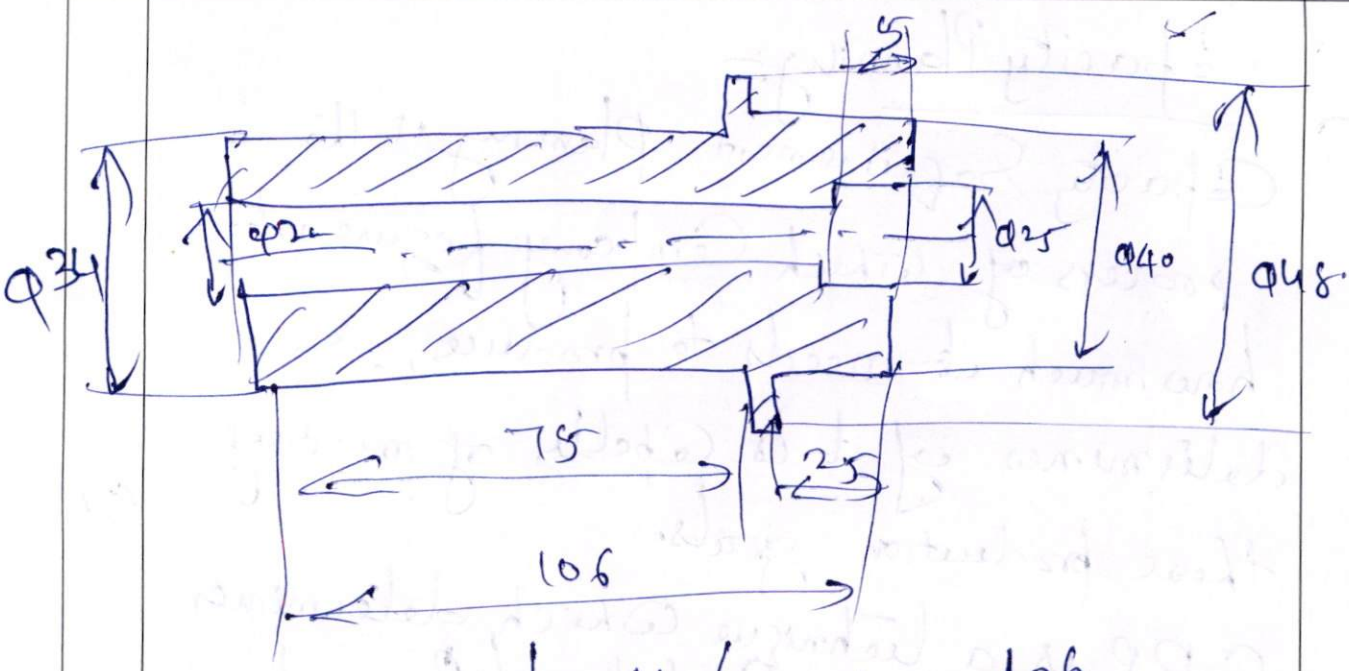
Generative System: It involves the use of the Computer to create an individual Process Plan automatically & without human assistance. 5M

Computer employ a set of algorithms to progress through the various technical and logical decision towards a find a plan



QNO	ANSWER	MARKS
8 (b)	**Capacity Planning:-** Capacity Requirement planning is the process of which Company figure out how much it needs to produce, So determines if it is capable of meeting these production goals. CRP is a technique which determines what equipment & labour/ Personal Capacities are required to meet the production objectives as per master production Schedule and material Requirement Planing.	5M
9	**Opitz Coding System:** In this system uses the following digit sequence 1 2 3 4 5 6 7 8 9 A B C D. 1 2 3 4 5 → form code 6 7 8 9 → Supplying Code A B C D. → Secondary code.	

QNO	ANSWER	MARKS



The overall length/draft = $\frac{106}{48}$

So first digit code = 1

QNO	ANSWER	MARKS
10 (a)	Computer aided Quality Control :— The Quality Control department is responsible for assuring that the Quality of the product & it meet the standard specified by the designer. Material & part purchased from out side suppliers must be inspected when they are received. final inspection of finished product is performed to test its overall function & appearance Quality.	5M
(b)	Basic Component of Computer integrated manufacturing (CIMS) Computer integrated manufacturing (CIM) including all engineering function of CAD/CAM, but also include the business function of the formwork.	

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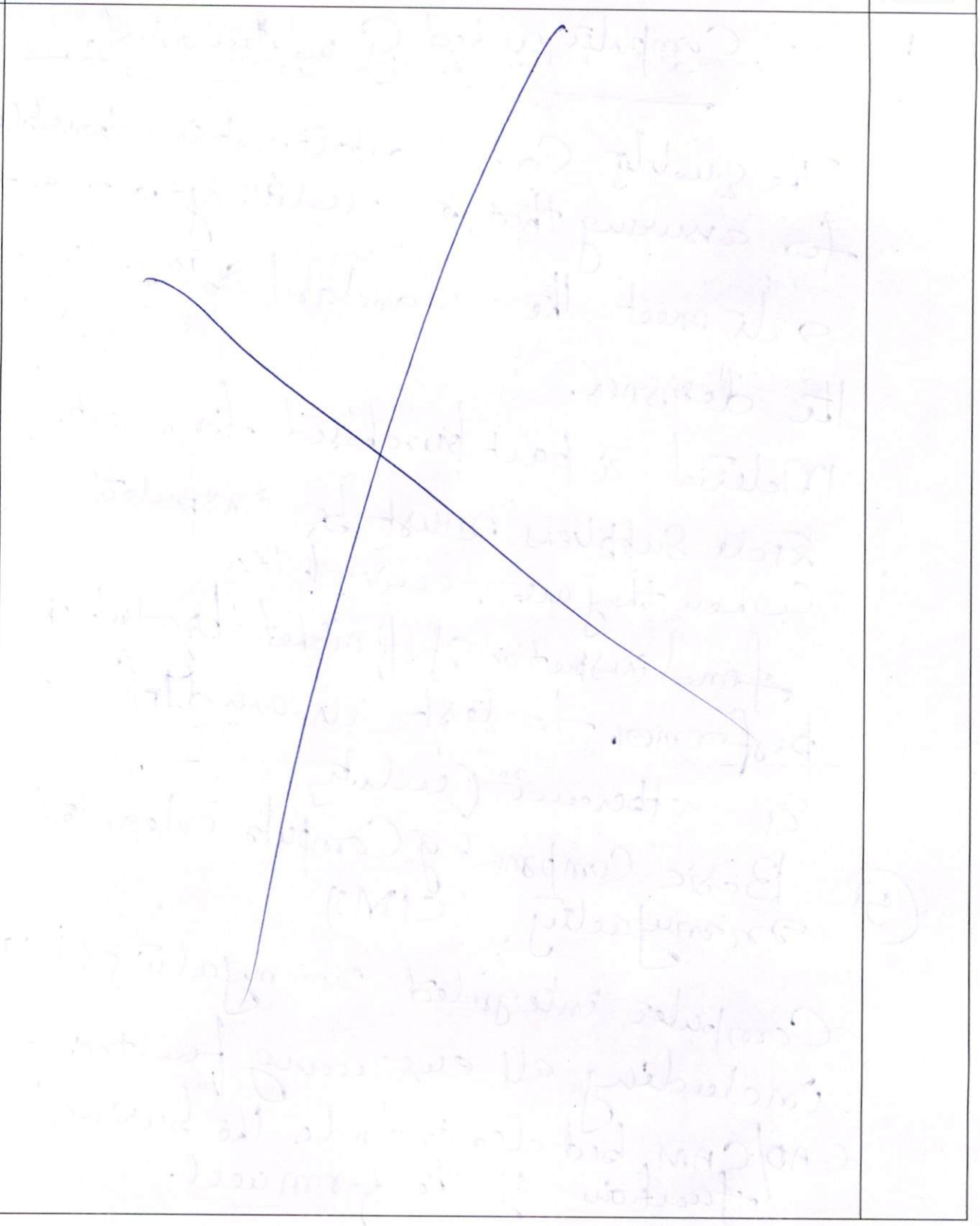
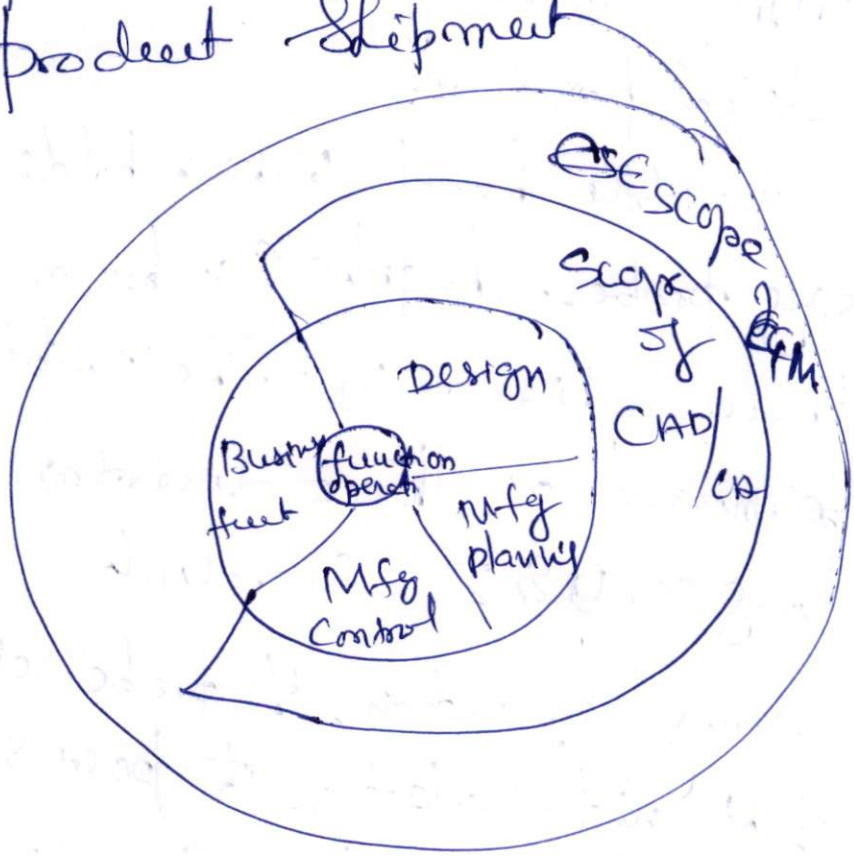
		

QNO	ANSWER	MARKS

The ideal CIM System applies Computer technology to all of the operational functions and information processing functions in manufacting from order receipts, thrugh design & production to product Shipment

SM



QNO	ANSWER	MARKS
11	Coordinate Measuring Machine (CMM). The coordinate measuring machine CMM is most important example equipment used for Contact inspection work-piece CMM Consist of table which holds registered position. A movable head which holds a sensing probe. The probe can be moved in three directions. The probe can be moved in three directions corresponding X, Y & Z Coordinate During operation, the probe is brought in to contact with part surface to be measured & the three coordinates position indicated to a high level accuracy.	(CMM

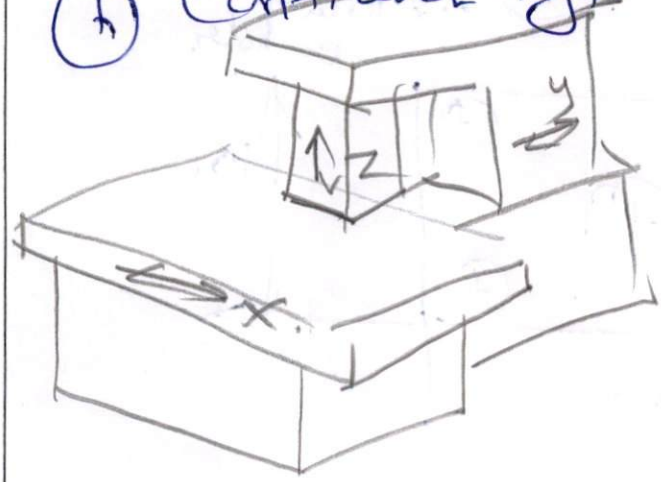
QNO	ANSWER	MARKS

Typical accuracy are those Machine are

± 0.002 inch

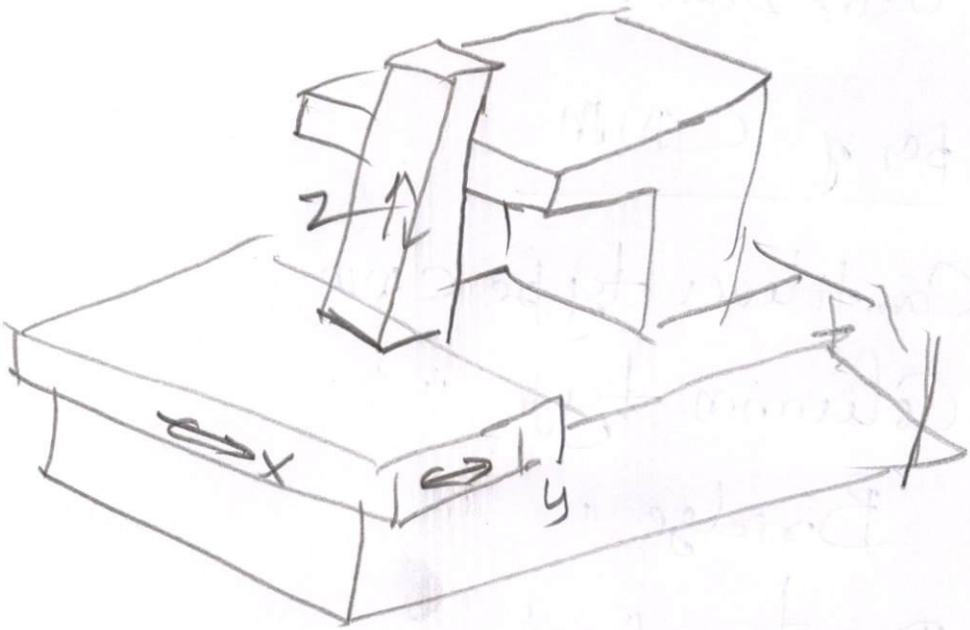
Type of CMM

1. Cantilever type CMM
2. Column type "
3. Bridge " "
4. Dantry " "
5. Cantilever type CMM

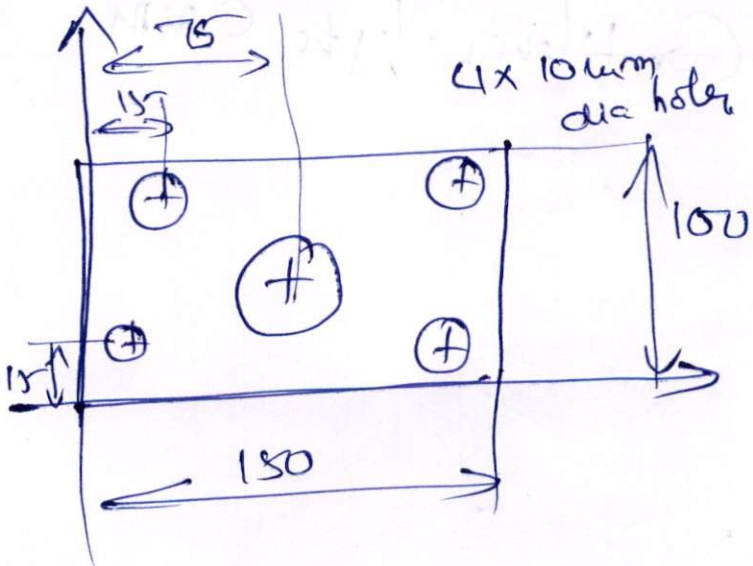


QNO	ANSWER	MARKS

(5) Column type CMM



(7) Part Program



QNO	ANSWER	MARKS

MACHIN/ DRILL ·1
CL PRINT
INTOL/0.001
OUTTOL/0.001
CUTTER/5.0
P_0 = POINT/0, −1.0, 0
P_1 = POINT/15.0, 15.0, 0.0
P_2 = POINT/75.0 15.0 0.0)
P_3 = POINT/15.0 7.5 0.0
P_4 = POINT/75.0, 75.0, 00.
P_5 = POINT/7.5, 7.5. 0

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