

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL and MANUFACTURING ENGINEERING

Bachelor in Engineering Industrial and Manufacturing Engineering

PART V - COMPUTER AIDED DESIGN /COMPUTER AIDED MANUFACTURING - TIE 5111

FIRST SEMESTER EXAMINATION - APRIL 2009

Time Allowed: 3 Hours

Answer 5 Questions

Question 1

- a) Briefly explain what is CAD with the aid of illustrations. [10]
- b) Explain briefly the output devices of the CAD system stating the factors you would use to select one of them and how the devices rank between one another. [10]

Question 2

- a) Briefly explain the concept and method of Failure Mode Effect Analysis (FMEA). [10]
- b) Develop an FMEA chart for an electric iron using five aspects as examples. [10]

Question 3

- a) Briefly discuss issues on software for CAD systems. [6]
- b) What are Data Exchange Systems and support the answer with examples? [6]
- c) The three vertices of a triangle are situated at points (50, 100), (80, 120), (20, 145). The triangle is given a rotation of 90° about an axis through the vertex (50, 100) and then scaled to twice its size using the same point as the base point. Find the coordinates of other two vertices. [8]

Question 4

- a) List and explain two surface modeling techniques. [4]
- b) With the aid of diagrams demonstrate two solid modeling techniques. [4]
- c) Given $\bar{p} = \bar{p}(u) = \bar{p}_0(1 - 3u^2 + 2u^3) + \bar{p}_1(3u^2 - 2u^3) + \bar{p}_0^1(u - 2u^2 + u^3) + \bar{p}_1^1(-u^2 + u^3)$
Calculate the parametric point of a Hermite cubic curve that fits the points $p_0(1, 1)$; $p_1(6, 5)$
and tangent vectors $p_0^1(0, 4)$; $p_1^1(4, 0)$, if parameter $u = 0.5$ [12]

Question 5

- a) Explain the Mantyla's Euler Operators. [8]
- b) For the object shown in Fig 5.1; Calculate the Euler coordinates and explain its relevance in commercial draughting packages. [12]

Given:

Inverse Euler Matrix= $\frac{1}{12}$

9	-5	2	-2	3	1
3	5	-2	2	-3	-1
-3	7	2	-2	3	1
-6	2	4	8	-6	2
3	5	-2	2	9	-1
-6	-2	8	4	-6	-2

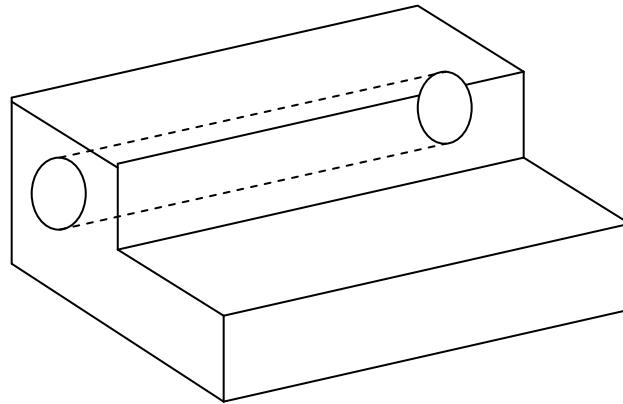


Fig Q5.1

Question 6

- Explain difference between parametric and variational design. [6]
- Write an AutoLISP program in AutoCAD to generate a drawing of the bold profile shown in Fig 6.1. The program should be such that the user only specifies the length of the sides, the start position and the rest of the drawing is generated automatically. [14]

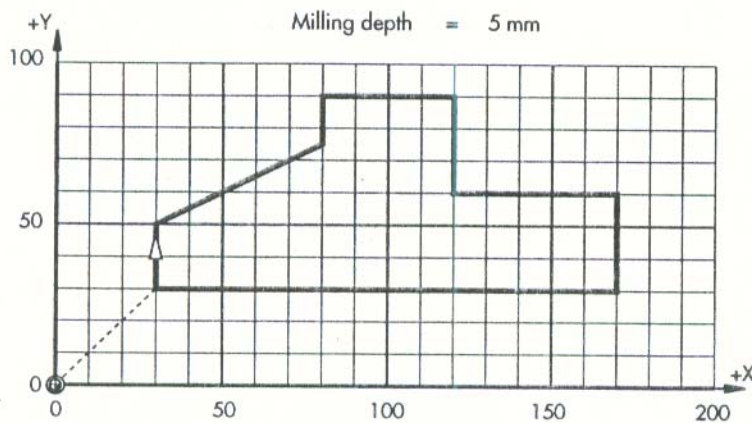


Fig Q6.1: Truck Profile

End of Exam