

# 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 – FEBRUARY 2010

Time Allowed: 3 Hours

Answer 5 Questions

#### QUESTION 1

- a) Briefly explain what is CIM with the aid of illustrations. [10]
- b) Explain briefly five parameters in the purchasing display systems. [10]

#### QUESTION 2

- a) Briefly explain the concept and method of Finite Element Analysis (FEA). [10]
- b) Briefly describe two surface modelling techniques with the aid of diagrams. [10]

#### QUESTION 3

- a) What are Data Exchange Systems and support the answer with two examples? [10]
- b) Given  $\bar{p} = \bar{p}(u) = \bar{p}_0(1 - 3u^2 + 2u^3) + \bar{p}_1(3u^2 - 2u^3) + \bar{p}_0'(u - 2u^2 + u^3) + \bar{p}_1'(-u^2 + u^3)$   
Calculate the parametric point of a Hermite cubic curve that fits the points  $p_0(6, 5)$ ;  $p_1(1, 1)$  and  
tangent vectors  $p_0'(0, 4)$ ;  $p_1'(4, 0)$ , if parameter  $u = 0.5$  [10]

#### QUESTION 4

- a) With the aid of diagrams demonstrate two solid modeling techniques. [10]
- b) The three vertices of a triangle are situated at points (5, 10), (8, 12), (2, 10). The triangle is given a rotation of  $60^\circ$  about an axis through the vertex (2, 10) and then scaled to twice its size using the same point as the base point. Find the coordinates of other two vertices. [10]

#### QUESTION 5

- a) Explain the term validity. [3]
- b) Apply validity to the diagram shown in Fig Q5.1. [3]
- c) For the object shown in Fig Q5.1; Calculate the Euler coordinates and explain its relevance in commercial draughting packages. [14]

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

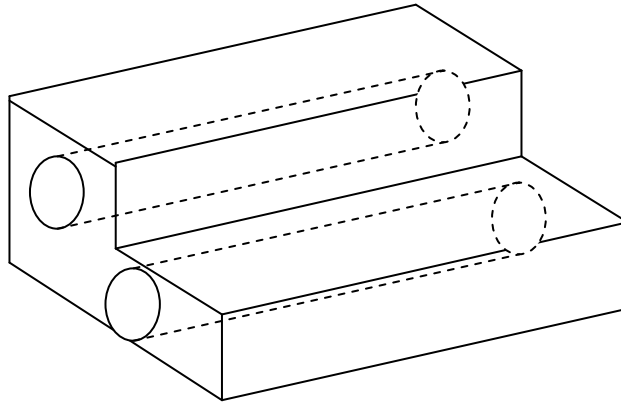


Fig Q5.1: Block with two through holes

### **QUESTION 6**

- Explain the term parametric design. [6]
- Write an AutoLISP program in AutoCAD to generate a drawing of the bold profile shown in Fig Q6.1. The program should calculate the mass automatically given the thickness is same as the milling depth. Assume the density of material is entered by the user. [14]

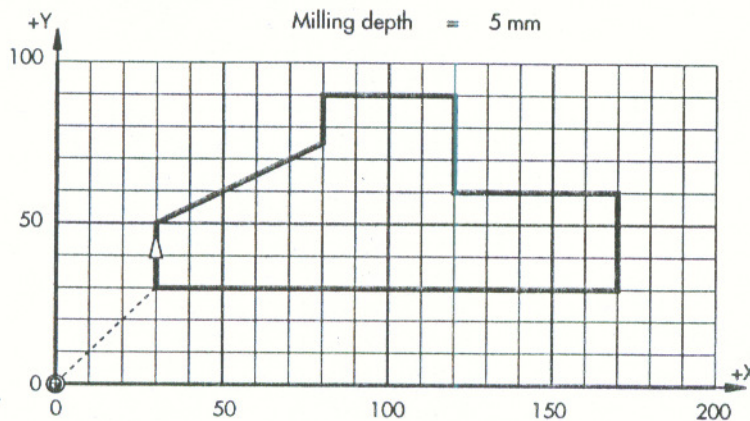


Fig Q6.1: Truck Profile

**END OF EXAM**