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B. E. (Seventh Semester) Examination, April-May 2020/

NOV DEC 2020

(New Scheme)

(Mech., Production Engineering Branch)

COMPUTER AIDED DESIGN & MANUFACTURING

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Part (a) of all questions are compulsory. Attempt any* ***two*** *parts from (b), (c) and (d) of each question.*
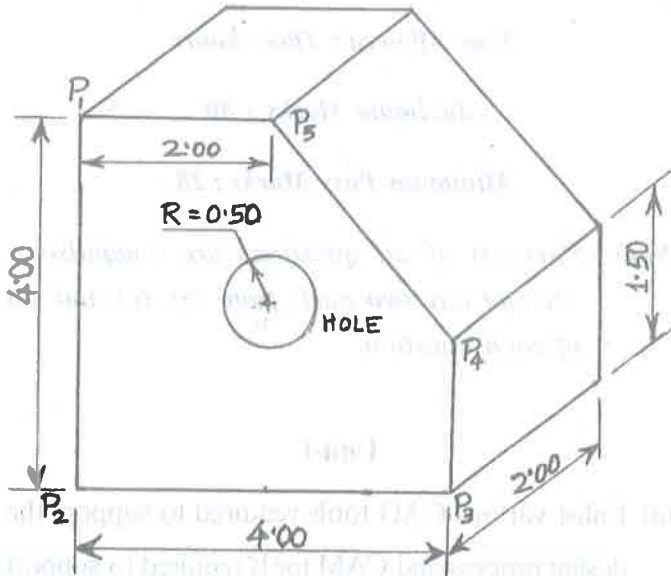
Unit-I

1. (a) Enlist various CAD tools required to support the design process and CAM tools required to support the manufacturing process.   2

(b) Draw and explain the product cycle with the implementation of CAD/CAM technology. 7

(c) What do you mean by World Coordinate System (WCS), user-based coordinate system (UCS) and device coordinate system (DCS)? Briefly explain them. 7

(d) Write a procedure to construct a hole shown in the model block (figure 1). Assume that UCS is active. All dimension in inches. 7

(Figure 1)

Unit-II

2. (a) Enlist the advantages of wire frame geometric modelling. 2

(b) What are analytical curves and synthetic curves? Explain them with examples. Also give the equations of the curves stated as examples of the two types of the curves. 7

(c) The coordinates of four control points relative to a UCS are given by :

$$P_0 = [2\ 2\ 0]^T;\quad P_1 = [2\ 3\ 0]^T;\quad P_2 = [3\ 3\ 0]^T;$$
$$P_3 = [3\ 2\ 0]^T$$

Determine the equation of the resulting Bezier curve. Also determine the points on the curve for :

u = 0, 0·2, 0·4, 0·6, 0·8 and 1·0

(d) What is 3-D modelling? Explain the advantages of 3-D modelling over wire-frame modeling. 7

Unit-III

3. (a) Define B-spline surface. What is the main advantage of this surface? 2

(b) The parametric equation of a sphere of radius 'R' and a centre point P_0 (x_0, y_0, z_0) is given by :

$$\left.\begin{array}{l} x = x_0 + R\cos u \cos v \\ y = y_0 + R\cos u \sin v \\ z = z_0 + R\sin u \end{array}\right] \begin{array}{l} -\dfrac{\pi}{2} \le u \le \dfrac{\pi}{2} \\ 0 \le v \le 2\pi \end{array}$$

Find the sphere implicit equation.   7

(c) What are the Solid Primitives? Briefly explain the types of primitives. Also enlist some of major advantages of the primitives.   7

(d) Compare the merits and demerits of boundary representation and sweep representation approaches in solid modelling.   7

Unit-IV

4. (a) Enlist at least four names of NC part programming languages.   2

(b) Compare NC, CNC and DNC systems. Also state advantages of combining CNC and DNC.   7

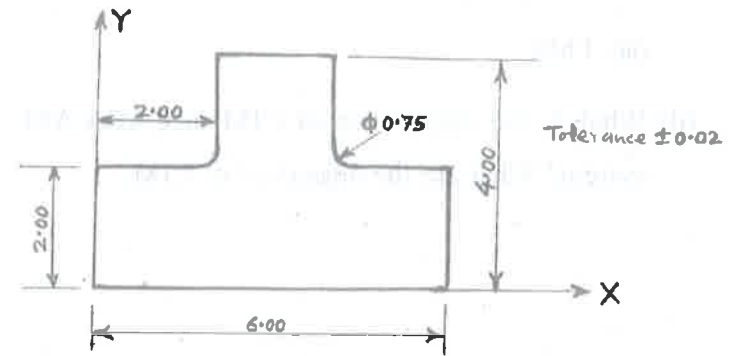(c) State and discuss the various statements of an NC part programming language.   7

(d) Develop an APT programme for milling operation to mill the contour of the part as shown in figure 2. Thickness of the part is 1·00 inch.

Home ⊗
Position (0, -1·5, 0)

(Figure 2)

Given that, milling cutter diameter 0·75 inch, cutting speed is 580 rpm, feed rate 2·30 inch/min, milling machine MILL5. The part is made of steel.   7

Unit-V

5. (a) State at least four benefits of CIM implementation.   2

(b) Explain in detail variant type process planning and generative type process planning with the help of their flow diagram.   7

(c) State the benefits of the following :   7

    (i)   Group technology

    (ii) CAPP

    (iii) FMS

(d) What is the importance of CIM in CAD/CAM system? What are the objectives of CIM?   7