Kafrelsheikh University
Faculty of Engineering
Department of Mechanical Engineering
4th year of Mechanical Production
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Date: 23 May 2019
Time allowed: 3 Hours
Full mark: 100 Marks
Final year exam, 2 Pages
Course code: MDP4236

Numerical Control Machines

Question 1 (50 Marks)

a. With the help of sketches, describe the different types of tools used in CNC milling machine.
b. With the help of sketches, describe the different types of tools used in CNC turning machine.
c. Explain the purpose of the Work Coordinate System (WCS) and considerations for its selection.
d. Identify the location of the machine home coordinate system.
e. List the major elements of a closed-loop servo control mechanism.
f. Plain the purpose of the fixture offset XY.
g. Using sketches, Explain the purpose of the tool length Offset and how to set it using three different methods.
h. List the sequence of operations in a typical CNC program.
i. Explain the purpose, general parameters, and use of facing toolpaths.
j. Explain the purpose, general parameters, and use of 2D contour toolpaths.

Question 2 (20 Marks)

a. Write the peck hole canned cycle to give the same operation in the following program and explain this canned cycle using sketches.

```
N70   Z0.06
N75   Z0.04
N80   G01   Z-0.19   F9.
N85   G00   Z0.06
N90   Z-0.11
N95   G01   Z-0.34
N100  G00   Z0.06
N105  Z-0.26
N110  G01   Z-0.49.
N115  G00   Z0.06
N120  Z-0.41
N125  G01   Z-0.64.
N130  G00   Z0.06
N135  Z-0.56
N140  G01   Z-0.79
N145  G00   Z0.06
N150  Z-0.71
N155  G01   Z-0.94.
N160  G00   Z0.06
N165  Z-0.86
N170  G01   Z-1.04.
N175  G00   Z0.25
```

b. Fill in the following table in your answer sheet then identify the types of operations in this CNC program.

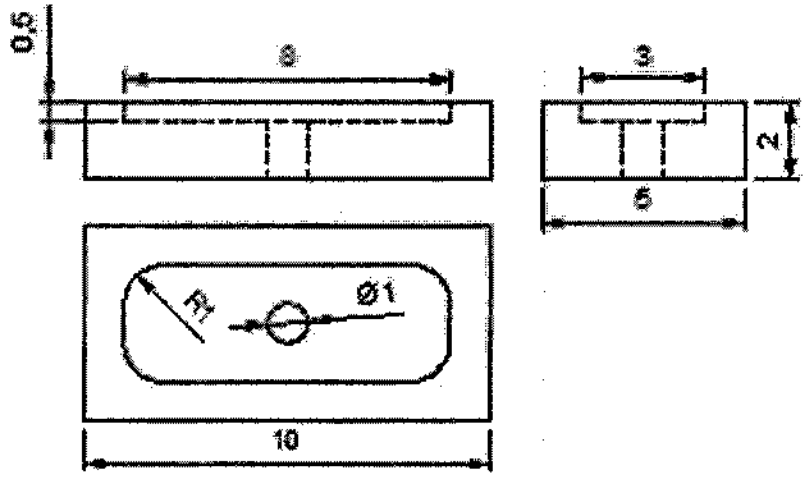
Block	Description	Purpose
%		
O0001 (PROJECT1)		
(T1 0.25 END MILL)		
N1 G17 G20 G40 G49 G80 G90		
N2 T1 M6		
N3 S9200 M3		
N4 G54		
N5 M8		
N6 G00 X-0.025 Y-0.275		
N7 G43 Z1. H1		
N8 Z0.1		
N9 G01 Z-0.1 F18.		
N10 G41 Y0.1 D1 F36.		
N11 Y2.025		
N12 X2.025		
N13 Y-0.025		
N14 X-0.025		
N15 G40 X-0.4		
N16 G00 Z1.		
N17 M5		
N18 M9		
(T2 0.25 DRILL)		
N19 T2 M6		
N20 S3820 M3		
N21 M8		
N22 X1. Y1.		
N23 G43 Z1. H2		
N24 Z0.25		
N25 G98 G81 Z-0.325 R0.1 F12.		
N26 G80		
N27 Z1.		
N28 M5		
N29 M9		
N30 G91 G28 Z0		
N31 G91 G28 X0 Y0		
N32 G90		
N33 M30		
%		

Numerical Control Machines

Question 2 **(30 Marks)**

Write a CNC program to machine the length, thickness, pocket, and hole of the part shown below. The part is saw cut to approximately 10.5 cm length and 5cm width and 2.2 cm high. Perform a Face milling, partial contour, and pocketing with a 4 flute, 20mm diameter, HSS endmill which is tool number 1 and drilling with a drill, 10mm diameter which is tool number 2. Use the following sequences of operations;

Partial contour – Zigzag face milling – Pocketing - Drilling.



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