



UNIVERSITI KUALA LUMPUR
KAMPUS CAWANGAN MALAYSIAN SPANISH INSTITUTE

FINAL EXAMINATION
JULY 2023 SEMESTER

COURSE CODE : SMD24903
COURSE NAME : CNC PROGRAMMING
PROGRAMME LEVEL : DIPLOMA
DATE : 27 SEPTEMBER 2023
TIME : 9:00 AM – 11:00 AM
DURATION : 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please **CAREFULLY** read the instructions given in the question paper.
2. This question paper consists of **TWO (2)** sections; Section A and Section B.
3. Answer **ALL** questions in Section A. For Section B, answer **THREE (3)** questions from **FOUR (4)** questions.
4. Please write your answers in the answer booklet.
5. Answer all questions in English language **ONLY**.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.



SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions in answer booklet provided.

Question 1

- a) CNC machining has advantages which not offered by conventional machines. Please describe **THREE (3) advantages** of CNC Machine compared to Conventional Machine.

(3 marks)

- b) Explain the difference between functions of G36 code and G39 code in a CNC program.

(2 marks)

- c) How many feed axes at minimum should be available on a CNC milling machine and what are the feed axes called?

(3 marks)

- c) Give the definitions for **Machine Reference Zero** and **Part Zero**:

(2 marks)

Question 2

- a) Refer to the **Figure 1**, write absolute coordinate systems. Define all X-Y axis value with creating a table for points P1-P2-P3-P4-P5-P6-P1 coordinates of the closed profile in **absolute** coordinate systems.

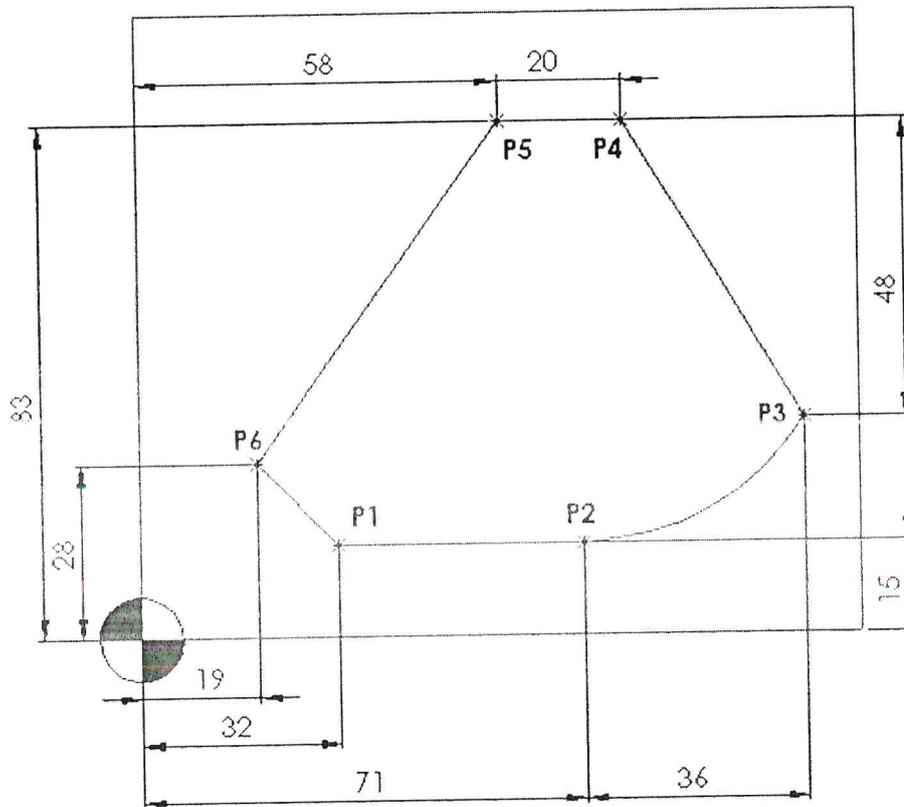


Figure 1

(14 marks)

- b) Refer to the **Figure 2**, write **absolute** coordinate systems from the Part Zero (0,0) until end point (P8). Make a table of coordinates from Part Zero(P0) to P8 in X and Z axis for each of the coordinate systems.

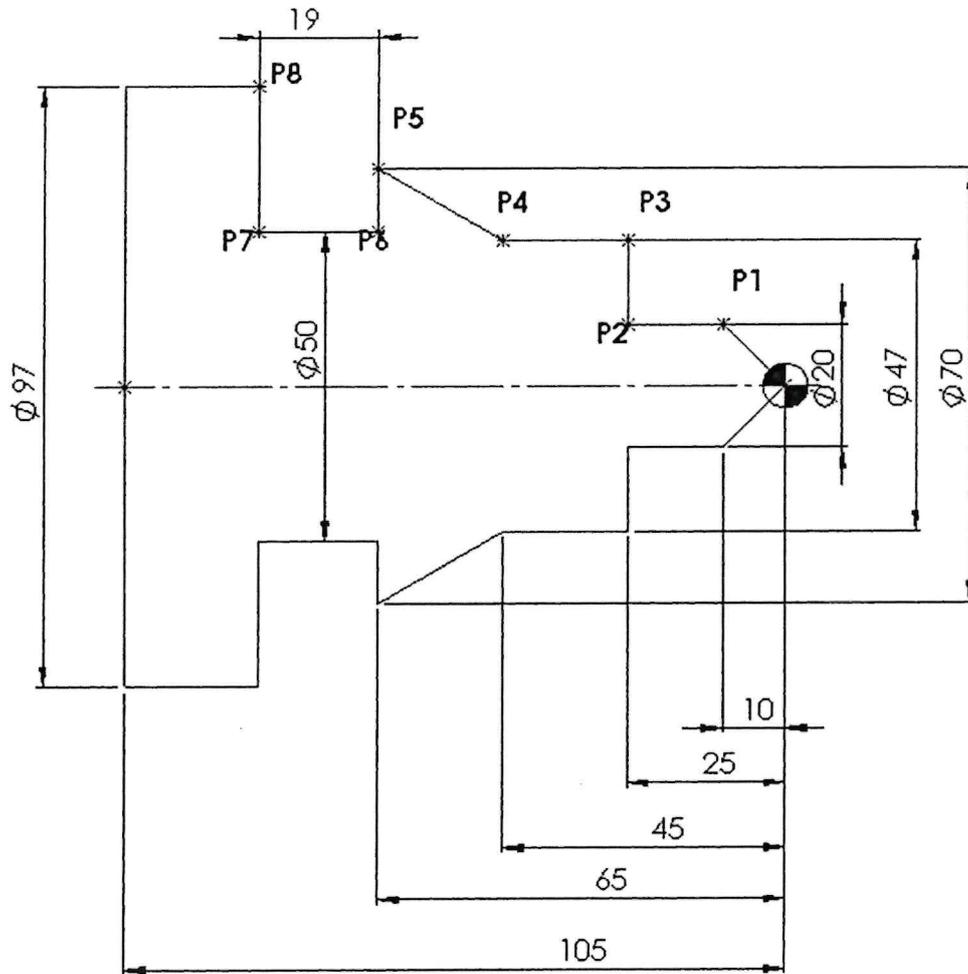


Figure 2

(16 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Please select and answer THREE (3) questions ONLY in answer booklet and programming sheet provided.

Question 1

Refer to the Figure 3 and data given, create program for CNC machining (lathe) by using absolute programming (G90) and the canned cycles. Ignore the parting process in programming. Write your answer on the programming sheet given.

Stock removal along X axis canned cycle : G68 X Z C D L M K F H S E Q

Grooving canned cycle along the X axis: G88 X Z Q R C D K

Given data:

- Raw material size = $\text{Ø}30 \times 110\text{mm}$ (mild steel)
- Constant Spindle speed = 700 RPM
- Feedrate (Turning) = 0.5 mm/rev
- Feedrate (Grooving) = 0.2 mm/rev

Types of tools use

- T1D1 = turning tool
- T3D3 = grooving tool (2mm width)

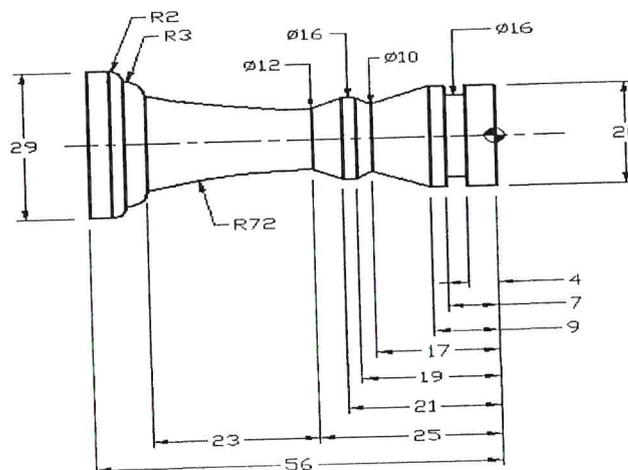


Figure 3

(20 marks)

Question 2

Refer to the **Figure 4** and given data below, create a profile program for CNC machining milling by using **absolute programming (G90)**. Machining process should be following the sequence from **P1 (X48, Y15)**. Location of the cutting tool before machining process is **(X-10, Y15)** and should be ended at **(X48, Y-10)**. Datum for Z-axis is on the top surface of the work piece. Write your answer on the **programming sheet given**.

Given data:

- Raw material : Aluminum
- Feedrate : 500 mm/min
- Spindle speed : T1 = 800 rpm
- Machining depth for profile = 15mm
- Penetration federate : 100 mm/min

Types of tool used

Tool T1 (Endmill diameter 5mm)

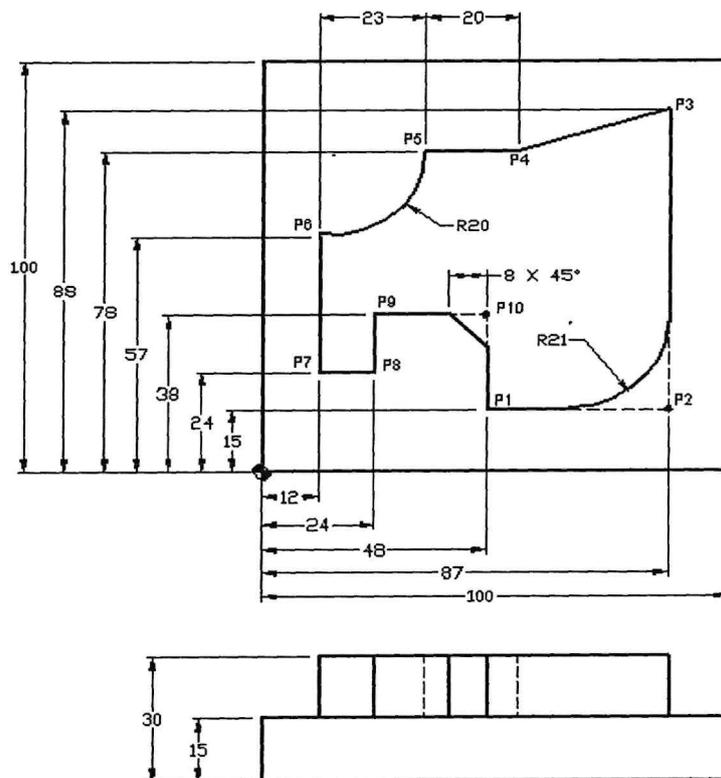


Figure 4

(20 marks)

Question 3

Refer to the **Figure 5** and given data, create program for CNC machining (lathe) by using **absolute programming (G90)** with suitable **canned cycle**. Make some space for clamping and ignoring the parting process in programming. Write your answer on the **programming sheet** given.

Stock removal canned cycle along X axis: **G68 X Z C D L M K F H S E Q**

Grooving canned cycle along the X axis: **G88 X Z Q R C D K**

Given data:

- Raw material size = $\varnothing 35 \times 120\text{mm}$ (Mild steel)
- Constant Spindle speed = 800 RPM
- Feedrate (roughing) = 0.3 mm/rev
- Feedrate (finishing) = 0.2 mm/rev
- Grooving width = 4 mm
- Grooving depth = 3 mm

Types of tools use

- T1D1 = Turning tool (for turning and facing)
- T2D2 = grooving tool (width 2mm)

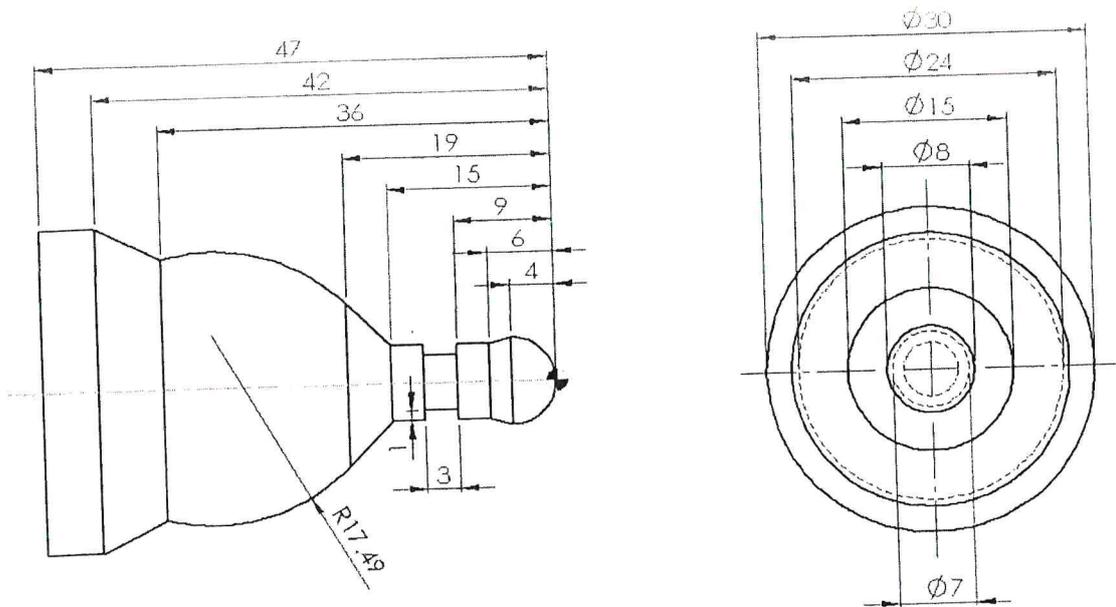


Figure 5

(20 marks)

Question 4

Refer to **Figure 6**, create a circular pocket canned cycle program to machine 20mm pocket centered in (X40, Y20). The pocket surface is at Z0 and is to be emptied down to Z-15. The reference plane is located at Z2. Write your answer on the **programming sheet** given.

Circular pocket canned cycle: **G88 G98/G99 X Y Z I J B C D H L V**

General information:

Positioning Type : Absolute
Origin at : Top left corner of the work piece
Main Plain : X, Y.
T1D1 : Ø10 mm
Feed Rate : 800 mm/min
Spindle Speed : 1000 rpm
Safety distance : 5 mm

Canned cycle information:

Pocket depth : 15 mm
Pocket radius : 20 mm
Depth of pass : 5 mm
Milling pass or width : 8 mm
Feedrate during finishing pass : 300 mm/min
Value of the finishing pass : 2 mm
Penetrating Feed Rate : 50 mm/min

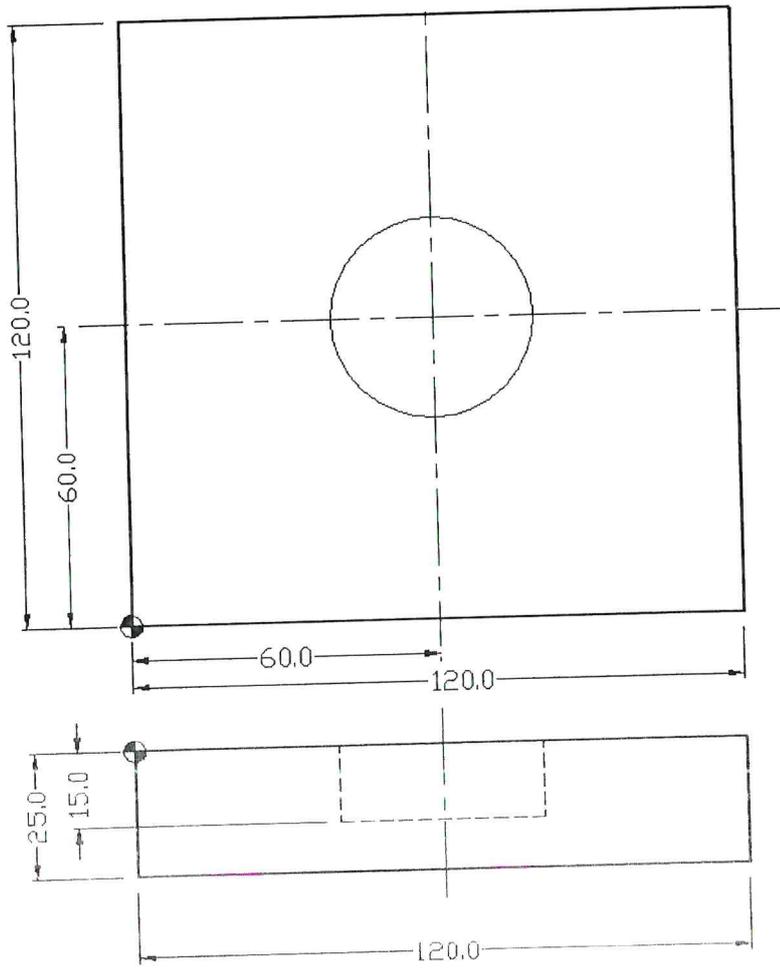


Figure 6

(20 marks)

END OF EXAM QUESTION

