Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022

COURSE NAME	:	CNC TECHNOLOGY AND CAD/CAM
COURSE CODE	:	BNM 30204
PROGRAMME CODE	:	BNM
EXAMINATION DATE	:	JULY 2022
DURATION	:	3 HOURS
INSTRUCTION	:	1. ANSWER ALL QUESTIONS 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK** 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 (a) (i) Explain the main difference between Numerical Control (NC) and Computer Numerical Control (CNC).

(4 marks)

(ii) Justify why Computer Numerical Control (CNC) machining is preferable for producing a complex part compared to conventional machining.

(6 marks)

(b) (i) There are **TWO (2)** types of the direction of cut in milling operation which are the up milling and climb milling. Distinguish the difference between up milling and climb milling with the aid of sketches of illustrations and explanations.

(9 marks)

(ii) Differentiate the function of clamping with collets and clamping between centres used in Computer Numerical Control (CNC) lathe machining.

(6 marks)

Q2 (a) Referring to the drawing in **Figure Q2 (a)**, figure out the suitable cutting method, tools and parameters to machine by using Computer Numerical Control (CNC) milling machine. All dimensions unit are in inch (in).

(6 marks)

(b) By applying the information in **Q2 (a)**, construct a Computer Numerical Control (CNC) milling program to produce the parts as in the drawing in **Figure Q2 (a)**.

(10 marks)

(c) A programmer would like to use subprogram for producing a part because encountering a sequence of machining instructions that must be repeated. The operations require an identical geometric pattern to be machined at three different locations within its body. Discuss the benefits of using subprogram in Computer Numerical Control (CNC) machining.

(4 marks)

(d) A face milling cutter is used in plain milling operation with a cutting speed scheduled at V_c = 220 m/min, and the number of rotations should not exceed 380 rpm. As a programmer, decide and justify the suitable face mill tool diameter by calculating the maximum diameter, d of the face milling cutter based on the scheduled parameters so that these values are not exceeded.

(5 marks)

Q3 (a) Define Drawing eXchange Format (DXF) and Initial Graphic Exchange Specification (IGES) data.

(4 marks)

(b) CAD/CAM allowed a Computer Aided Drafting (CAD) system to draw the geometry of a workpiece on a computer and integrate with a Computer-Aided Manufacturing (CAM) software for the Computer Numerical Control (CNC) program development of a part. Explain the CAD/CAM approach to part programming.

(5 marks)

(c) (i) Identify **FOUR (4)** significant points of programming upgrading (optimization) Computer Numerical Control (CNC) program.

(8 marks)

(ii) Describe **FOUR (4)** basic terminologies used in programming of Computer Numerical Control (CNC) program.

(4 marks)

(iii) Distinguish the function of the codes G, M, F and S used in the program.

(4 marks)

Q4 (a) Illustrate **TWO (2)** coordinate systems of the Computer Numerical Control (CNC) lathe machine with sketches and explanations.

(9 marks)

(b) Referring to **Figure Q4 (b)**, decide the suitable cutting methods, tools and parameters to produce the parts by using Computer Numerical Control (CNC) lathe machine. The part shown in the drawing was previously roughed. All dimensions unit are in inch (in).

(6 marks)

(c) Using the information provided in **Table Q4 (c),** propose a Computer Numerical Control (CNC) lathe program to machine the parts as in the drawing in **Figure Q4 (b)**. Use tool nose radius (TNR) of 0.03.

(10 marks)

- END OF QUESTIONS –

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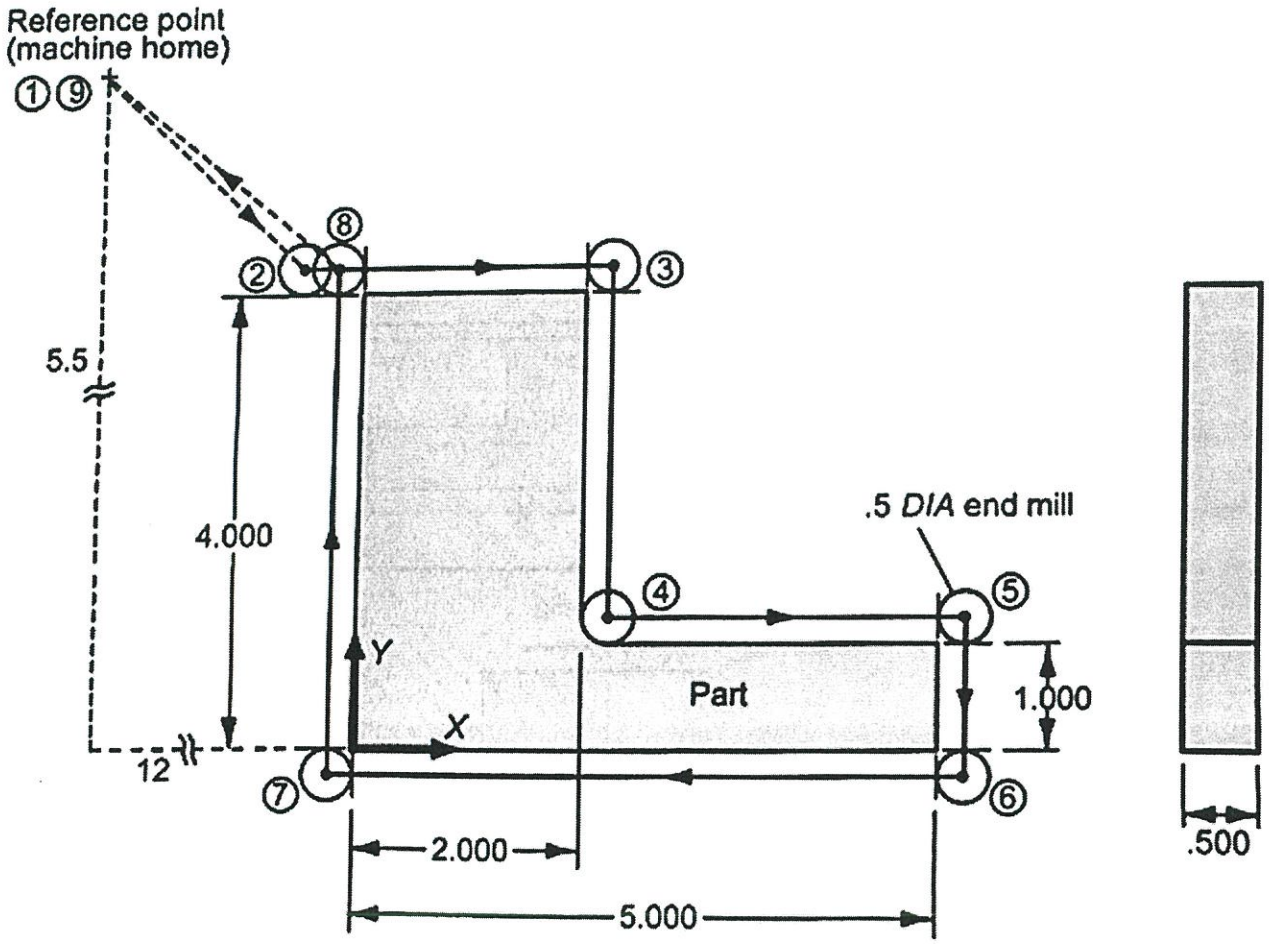

Figure Q2 (a)

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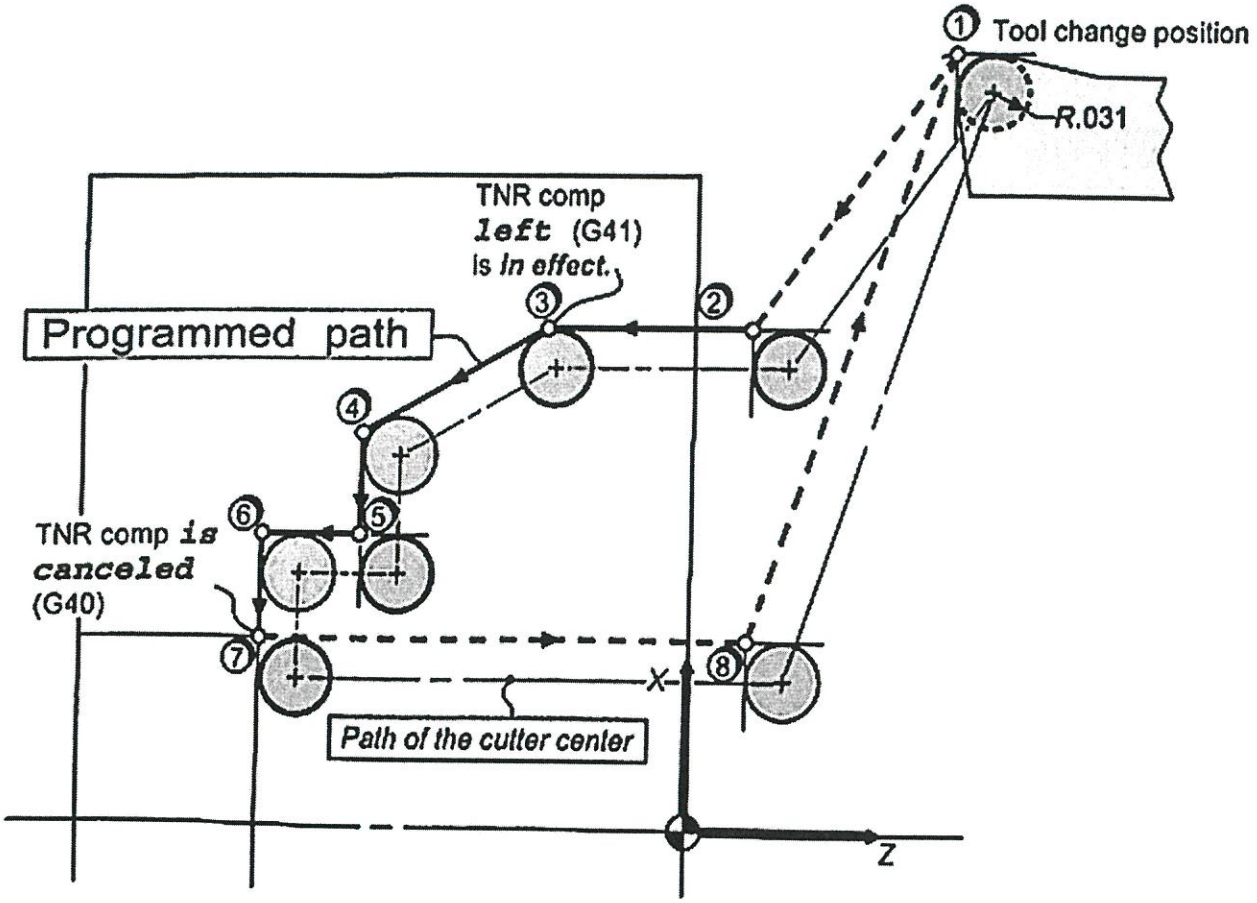

Figure Q4 (b)

Table Q4 (c)

Point	X (inch) diameter	Z (inch)
1	12.000	5.000
2	2.600	0.100
3	2.600	-0.900
4	2.200	-1.800
5	1.800	-1.800
6	1.800	-2.400
7	0.938	-2.400
8	0.938	0.100