GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(OLD) • EXAMINATION – WINTER 2017

Subject Code: Computer Aided Manufacturing   **Date:18/11/2017**
Subject Name: 172501
Time:10.30 AM TO 01.00 PM   **Total Marks: 70**

Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Support your answers by neat sketches wherever necessary.
5. Use of G – codes & M – codes provided by GTU is permitted.

Q.1	(a)	Write advantages & disadvantages of CNC machines.	07
	(b)	Explain various stages involved with NC manufacturing. How do they differ from conventional manufacturing stages?	07
Q.2	(a)	Explain with neat sketches the following: (i) Machine zero (ii) Program zero (iii) Part zero	07
	(b)	Name different punch tape readers & explain any two of them.	07
		OR	
	(b)	Explain briefly the constructional features ball screw with neat sketches & state its application.	07
Q.3	(a)	Explain Do loop and Macro facilities of programming with suitable examples.	07
	(b)	The figure -1shows the dimensions of a finished component to be made from a bar of Ø80 mm X 135 mm. Write the manual part programme to machine the component using G90 canned cycle. Refer to Table -1 for G-codes & M-codes. Use following process plan:	07

Operation No.	Operation	Tool No.	Cutting Speed (m/min)	Feed Rate (mm/rev)	Depth of Cut (mm)
10	Facing	01	160	0.15	-
20	Rough turning	03	200	0.20	4 (max.)
30	Finish turning	03	200	0.15	1.5(max.)

OR

Q.3	(a)	What is Automated Guided Vehicles? Explain different types of AGVs with their advantages and limitations.	07
	(b)	Prepare the process plan & write manual part programme for profile milling of the part shown in figure -2. Assume the plate thickness to be 10 mm. Refer to Table -1 for G-codes & M-codes.	07
Q.4	(a)	What are different types of computer aided process planning? Explain with suitable examples.	07
	(b)	Write short notes on: (i) Robot sensors & (ii) End-effectors in robots.	07
		OR	
Q.4	(a)	Give advantages, limitations and applications of flexible manufacturing system.	07
	(b)	What is group technology? Explain benefits of GT.	07
Q.5	(a)	What is meant by adaptive control? Explain all types of adaptive control.	07
	(b)	Write short note on "Selective Laser Sintering" technique of rapid prototyping.	07
		OR	
Q.5	(a)	Define Mechatronics. Discuss various elements of mechatronics.	07

1

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(b) What is part family? Explain various classification and coding systems of group technology. **07**

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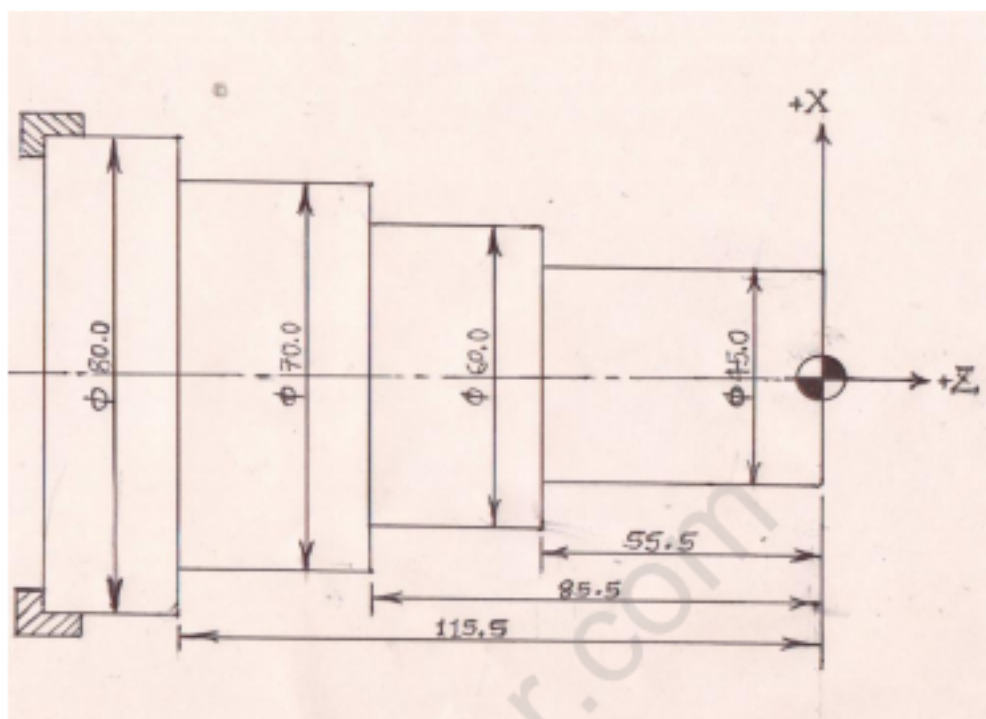
Figure – 1 [Q.3 (b)]

Figure – 2 [OR Q.3 (b)]

Table -1

2

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NC/CNG Manual Part Programming Codes
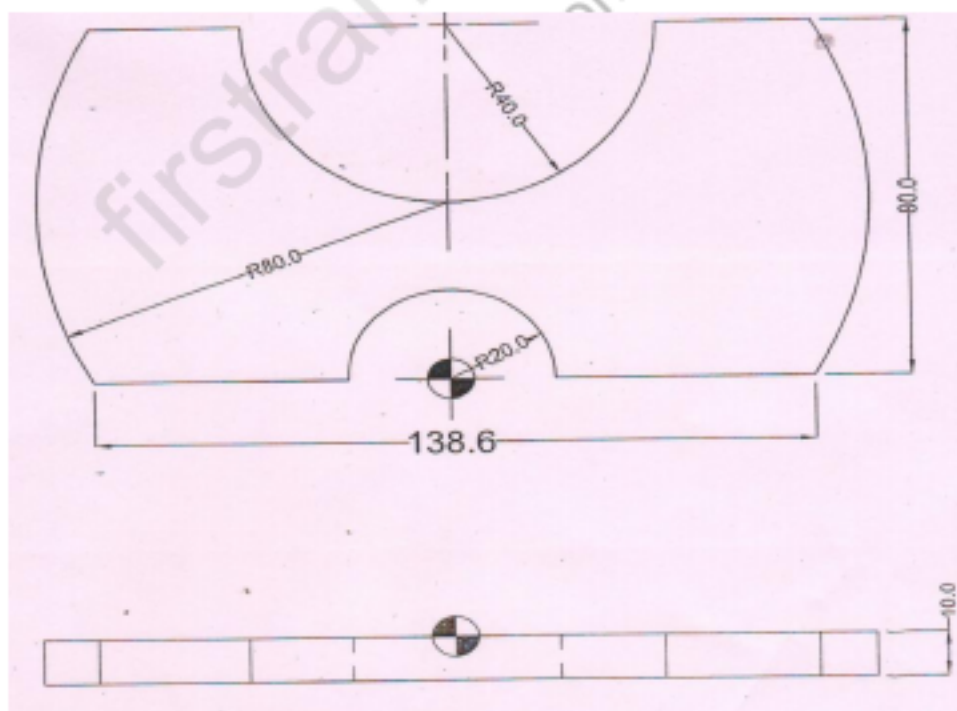
Turning Center FANUC OT Controller		Machining Center FANUC OM Controller	
G00	Positioning in Rapid	G00	Positioning in Rapid
G01	Linear Interpolation	G01	Linear Interpolation
G02	Circular Interpolation (CW)	G02	Circular Interpolation (CW)
G03	Circular Interpolation (CCW)	G03	Circular Interpolation (CCW)
G04	Dwell	G04	Dwell
G20	Inch Units Programming	G17	XY Plane
G21	Metric Units Programming	G18	XZ Plane
G28	Automatic return to reference point	G19	YZ Plane
G29	Automatic return from reference point	G20	Inch Units Programming
G40	Cutter compensation Cancel	G21	Metric Units Programming
G41	Cutter compensation Left	G28	Automatic return to reference point
G42	Cutter compensation Right	G29	Return from Zero Return Position
G43	Tool Length Compensation (Plus)	G40	Cutter compensation Cancel
G44	Tool Length Compensation (Minus)	G41	Cutter compensation Left
G49	Tool Length Compensation Cancel	G42	Cutter compensation Right
G50	Maximum spindle speed in rpm	G43	Tool Length Compensation (Plus)
G96	Constant surface speed ON	G44	Tool Length Compensation (Minus)
G97	Constant surface speed OFF	G49	Tool Length Compensation Cancel
G98	Feed rate, per min	G90	Absolute Positioning/ Programming
G99	Feed rate, per rev.	G91	Incremental Positioning/ Programming
		G94	Feed rate, per min
		G95	Feed rate, per rev.
		G98	Return to initial point level
		G99	Return to R point level

Canned Cycles		**Canned Cycles**	
G90	Single Pass Turning Cycle	G73	High Speed Peck Drilling Cycle
G92	Single Pass Threading Cycle	G74	Left hand Tapping Cycle
G94	Single Pass Facing Cycle	G76	Fine Boring Cycle
G70	Finishing Cycle	G80	Cancel Canned Cycles
G71	Turning Cycle	G81	Spot Drilling Cycle
G71	Multi-pass Rough Turning Cycle	G82	Counter Boring Cycle
G72	Multi-Pass Rough Facing Cycle	G83	Deep Hole Peck Drilling Cycle
G73	Pattern Repeating	G84	Right hand Tapping cycle
G74	Grooving in Z-axis	G85	Boring Cycle
G75	Grooving in X-axis		
G76	Multi-Pass Thread Cutting		

Miscellaneous Codes			
M00	Program Stop	M06	Tool Change
M01	Optional Program Stop	M98	Subprogram Call
M02	Reset	M99	Subprogram End
M03	Spindle On/start Clockwise	M70	Mirror On – X
M04	Spindle On/start Counterclockwise	M71	Mirror On – Y
M05	Spindle Stop	M80	Mirror Off – X
M08	Coolant On	M81	Mirror Off – Y
M09	Coolant Off	M30	Program End & Rewind
M30	Program End & Rewind	M00 to M09	– same as Turning Center codes