

GANPAT UNIVERSITY
B.TECH VIII SEM MECHATRONICS ENGINEERING
REGULAR CBCS EXAMINATION April - June 2015
2MC802 COMPUTER INTEGRATED MANUFACTURING
TIME – 3 HOURS **TOTAL MARKS- 70**

- INSTRUCTION:-
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Make suitable assumptions wherever necessary.
 - 4) Programming code (G and M codes) is given at the end of paper.

SECTION-I

- Q-1 (a) Enlist the feedback device. Explain any one linear and rotary feedback device. [4]
- (b) A flexible manufacturing system consists of four workstation plus and load/unload station. The load/unload station 1. Station 2 will perform milling operations and consists of three server (one CNC milling machine). Station 3 has two server that performs drilling (one CNC drill press). Station 4 is an inspection station with one server. The stations are connected by a part handling system that has two work carriers and a mean transport time = 3.5 min. The FMC produce Four parts A, B, C and D. The part mix fractions are process routings for the four parts are presented in the table below. Note that the operation frequency at the inspection station (f_{ijk}) is less than 1.0 to account for the fact that only a fraction of the parts are inspected. Determine: (a) maximum production rate of FMS, (b) corresponding production rate of each part, (c) utilization of each station in the system, and (d) the overall FMS utilization. [8]

Part j	Part Mix P _j	Operation k	Description	Station i	Process Time t _{ijk} (min)	Frequency f _{ijk}
A	0.1	1	Load	1	4	1.0
		2	V.Mill	2	20	1.0
		3	Drill	3	15	1.0
		4	Inspect	4	12	0.5
		5	Unload	1	2	1.0
B	0.2	1	Load	1	4	1.0
		2	Drill	3	16	1.0
		3	V.Mill	2	25	1.0
		4	Drill	3	14	1.0
		5	Inspect	4	15	0.2
		6	Unload	1	2	1.0
C	0.5	1	Load	1	4	1.0
		2	Drill	3	23	1.0
		3	Inspect	4	8	0.5
		4	Unload	1	2	1.0
D	0.35	1	Load	1	4	1.0
		2	V.Mill	2	30	1.0
		3	Inspect	4	12	0.333
		4	Unload	1	2	1.0

OR

- Q-1 (a) What is flexibility? Discuss different flexibility of FMS. [4]
- (b) Briefly explain the basis of designating the co-ordinate axes in CNC machine tools. [4]

- (c) Apply the rank order clustering technique to the part- machine incidence matrix in the following table to identify logical part families and machine groups. Parts are identified by letters, and machines are identified numerically. [4]

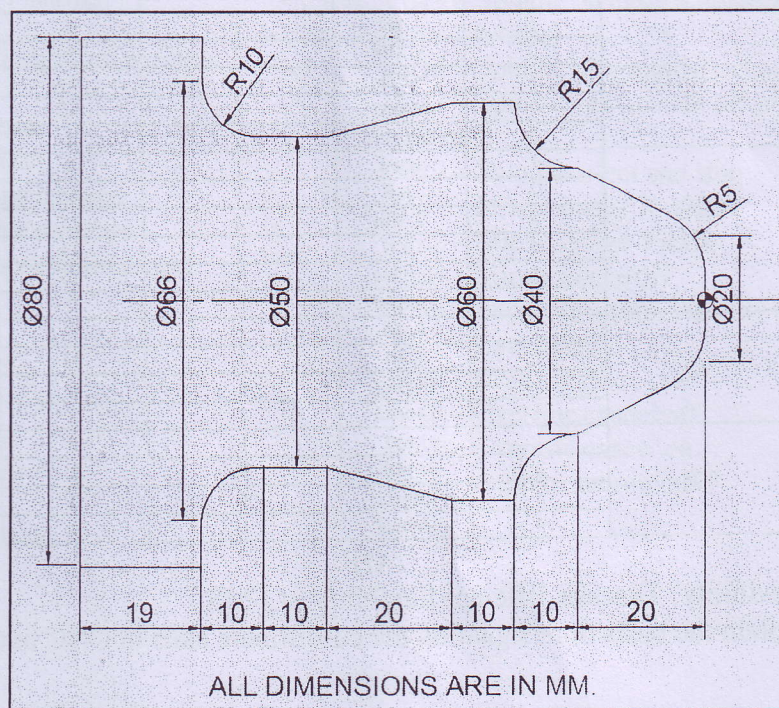
Part	1	2	3	4	5	6	7	8
M/C								
1	1		1	1				
2					1	1		
3	1	1		1				1
4					1	1	1	
5		1	1	1				
6	1							1
7					1		1	

- Q-2 (a) What is DNC? Discuss its components. Give its advantages and disadvantages. [4]
 (b) What is a Flexible Manufacturing system? What renders it so flexible? [4]
 (c) Briefly describe about types of electrical drives used in CNC machine tools. [4]

OR

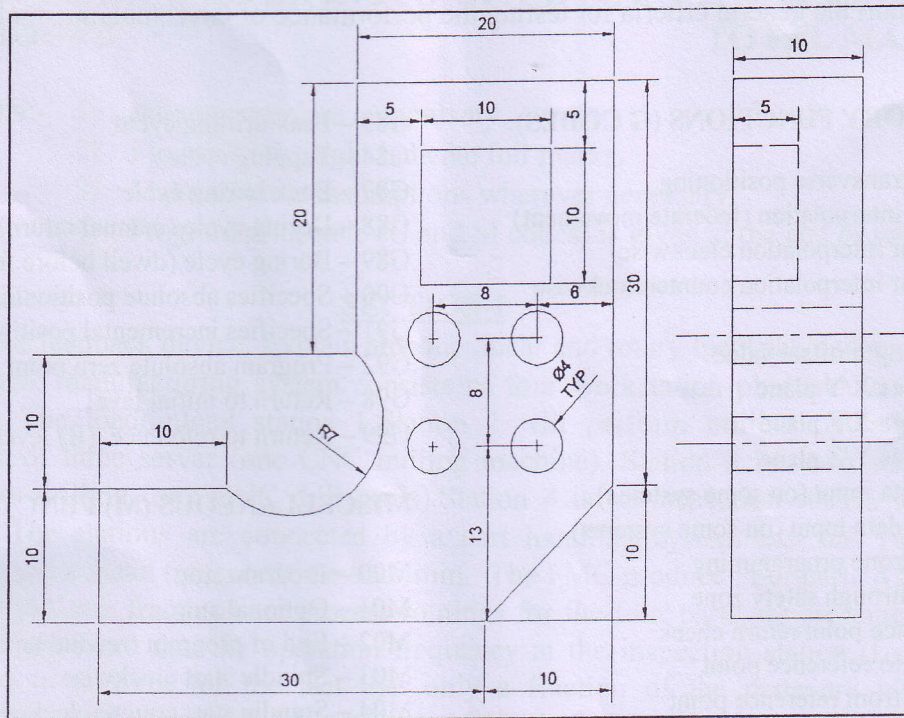
- (a) Explain ATC in CNC Machine tool. [4]
 (b) What are the different between MCS and WCS? [4]
 (c) What is CAPP? Explain Retrieval type CAPP [4]

- Q-3 (a) Write a program of CNC Turning Centre for following component shown in Figure [5]
 Raw Material Size : $82\text{Ø mm} \times 105\text{ mm}$ Long



- (b) Write a CNC Machining Center Program of given components.
Raw Material size: 45 mm X 45 mm X 10 mm.

(6)



SECTION-II

- Q-4 (a) What do you understand in CIM? Which type of Activities of CIM? [4]
 (b) What is Group Technology? What are the favorable conditions for Applying GT? Explain the benefits of Group Technology with their area of application. [4]
 (c) Explain the structure used in classification & Coding system: [4]

OR

- Q-4 (a) What do you mean by CAD/CAM integration? Explain application integration [4]
 (b) Explain Optiz coding system with example. [4]
 (c) Discuss the main elements of CIM system. [4]

- Q-5 (a) What is AS/RS system? Explain types of AS/RS and its applications. [4]
 (b) What is AGV? Explain AGV systems. [3]
 (c) Explain the 10 principles of material handling. [4]

OR

- Q-5 (a) Discuss the various FMS layout configurations. [4]
 (b) What are the various approaches available for CAPP? Explain Generative type CAPP [3]
 (c) Explain MICLASS coding system of GT to form part families. [4]

- Q-6 Attempt Any Three [12]
 (a) Explain Network Topology in CIM

- (b) Explain classification of DBMS.
- (c) Which are the common network services are available? Explain
- (d) Explain the general criteria for testing the performance of CNC machine tool.

PREPARATORY FUNCTIONS (G CODES):

- G00 – Rapid transverse positioning
- G01 – Linear interpolation (federate movement)
- G02 – Circular interpolation clockwise
- G03 – Circular interpolation counterclockwise
- G04 – Dwell
- G10 – Tool length offset value
- G17 – Specifies X/Y plane
- G18 – Specifies X/Z plane
- G19 – Specifies Y/Z plane
- G20 – Inch data input (on some systems)
- G21 – Metric data input (on some systems)
- G22 – Salary zone programming
- G23 – Cross through safety zone
- G27 – Reference point return check
- G28 – Return to reference point
- G29 – Return from reference point
- G30 –Return to second reference point
- G40 – Cutter diameter compensation cancel
- G41 – Cutter diameter compensation left
- G42 – Cutter diameter compensation right
- G43 – Tool length compensation positive direction
- G44 – Tool length compensation negative direction
- G45 – Tool offset increase
- G46 – Tool offset decrease
- G47 – Tool offset double increase
- G48 – Tool offset double decrease
- G49 – Tool length compensation cancel
- G50 – Scaling off
- G51 – Scaling on
- G73 – Peak drilling cycle
- G74 – Counter tapping cycle
- G76 – Fine boring cycle
- G80 – Canned cycle cancel
- G81 – Drilling cycle
- G82 – Counter boring cycle

- G83 – Peak drilling cycle
- G84 – Tapping cycle
- G87 – Back boring cycle
- G88 – Boring cycle (manual return)
- G89 – Boring cycle (dwell before feed return)
- G90 – Specifies absolute positioning
- G91 – Specifies incremental positioning
- G92 – Program absolute zero point
- G98 – Return to initial level
- G99 – Return to reference (R) level.

MISCELLANEOUS (M) FUNCTIONS:

- M00 – Program stop
- M01 – Optional stop
- M02 – End of program (rewind tape)
- M03 – Spindle start clockwise
- M04 – Spindle start counterclockwise
- M05 – Spindle stop
- M06 – Tool change
- M08 – Coolant on
- M09 – Coolant off
- M13 – Spindle on clockwise, coolant on (on some systems)
- M14 – Spindle on counterclockwise, coolant on
- M17 – Spindle and coolant off (on some systems)
- M19 – Spindle orient and stop
- M21 – Mirror image X axis
- M22 – Mirror image Y axis
- M23 – Mirror image off
- M30 – End of program, memory reset
- M41 – Low range
- M42 – High range
- M48 – Override cancel off
- M49 – Override cancel on
- M98 – Jump to subroutine