Exam No:_____

GANPAT UNIVERSITY

B. Tech. Semester: VIII Mechatronics Engineering

Regular Examination April – June 2016

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) A flexible manufacturing cell consists of three plus a load/unload stations. The (8)
load/unload station is stations1 using two servers (material handling workers). Station
2 performs milling operations and consists of two server(two CNC milling machine).
Station 3 performs vertical milling operations with three servers(three identical CNC
vertical milling machine). Station 4 has two server that performs drilling (two CNC
drill press). The three stations are connected by a part handling system that has three
work carriers. The mean transport time is 3.5 min. The FMC produces four parts A, B,
C and D, the part mix fractions are process routings for the three parts are presented in
the table below. The operation frequency F_{ijk} = 1.0 for all operations. Determine: a)
maximum production rate of the FMC, b) corresponding production rates of each
product.

Part j	Part Mix Pj	Operation k	Description	Station i	Process Time tijk (min)
A	0.2	1	Load	1	4
		2	Mill	2	15
		3	V.Mill	3	14
		4	Drill	4	13
		5	Unload	1	3
B	0.3	1	Load	1	4
		2	Drill	4	12
		3	Mill	2	16
		4	V.Mill	3	11
		5	Drill	4	17
		6	Unload	1	3
C	0.5	1	Load	1	4
		2	Mill	2	10
		3	Drill	4	9
		4	Unload	1	3
D	0.35	1	Load	1	4
		2	V.Mill	3	18
		3	Drill	4	8
		4	Unload	1	3

Suppose it is decided to increase the utilization of the two non-bottlenecks machining stations in the FMS by introducing a new past, part E, into the part mix. If the new product will be produced at a rate of 2 units/hr, what would be the ideal process routing (sequence and processing times) for part E that would increase the utilization of the two non-bottleneck machining stations to 100% each? The respective production rats of part A, B, C, and D will remain the same. Disregard the utilization of the load/unload station and the part handling system.

(b) Define the following terms of FMS 1) FMM 2) FMC 3) FMG 4) FPS. [4]

OR

Q-1 (a) Enlist the FMS Elements and explain about FMS layout. [6]

(b) Consider the following machine-component incidence matrix with 7 machines and 5 components. Obtain the final machine-component cells using Rank Order Clustering Algorithm. [6]
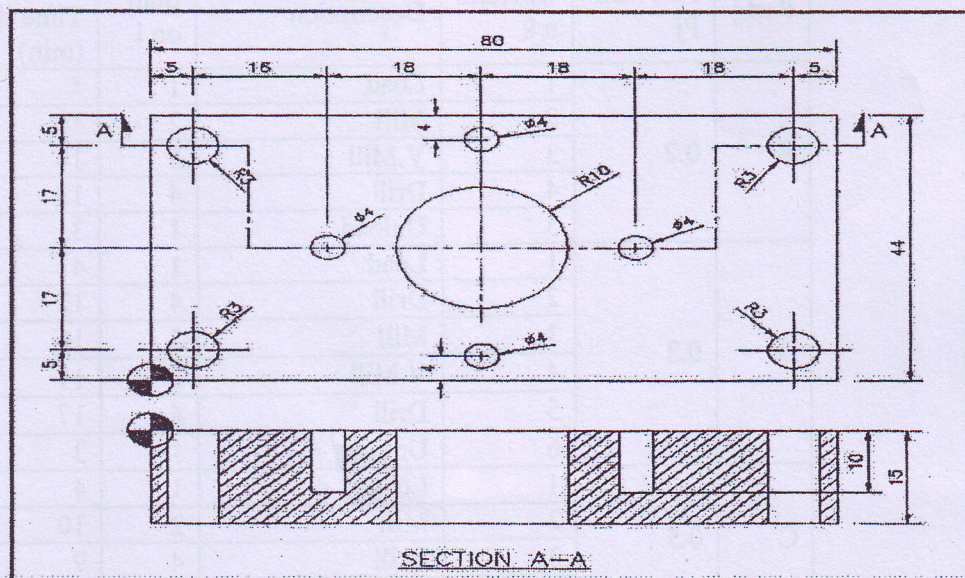
		Component				
		1	2	3	4	5
Machine	1	0	1	0	1	0
	2	1	0	0	0	1
	3	0	1	1	0	0
	4	1	0	0	0	1
	5	0	0	1	1	0
	6	0	0	0	0	1
	7	0	1	1	1	0

Q-2

(a) Write a CNC Drilling part program for a following Component.
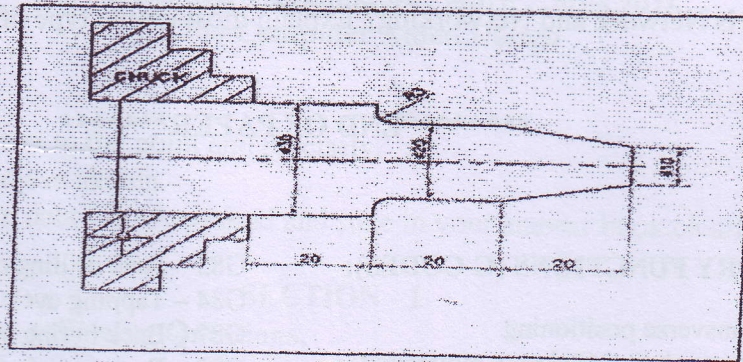Raw material size: 40 X 80 X 20 mm. [6]

SECTION A—A

(b) What is Group Technology? What are the favorable conditions for Applying GT? Explain the benefits of Group Technology with their area of application. [5]

OR

Q-2 (a) Write a program of CNC Turning Center for following component shown in fig: **[6]**
Raw Material Size: Ø 30 mm X 80 mm Long

(b) Explain MICLASS system. **[5]**

Q-3 **Attempt Any Three.** **[12]**

(a) Define following terms of AGV.
1) Guide path 2) Routing 3) Scheduling 4) Idle vehicle

(b) What is automatic storage system? Why it required? Compare AS/RS with Carousel storage system.

(c) Explain methods used for grouping part families.

(d) What are the formats used for writing programs?

SECTION-II

Q-4 **[12]**

(a) What do you know about Preset tooling for NC turning machine? What are the various features to be taken care of while designing a CNC tool?

(b) Explain classification of DBMS.

(c) What is Adaptive control machining system? Explain types of adaptive control machining system.

OR

Q-4 **[12]**

(a) Discuss how sliding friction is converted into rolling friction in CNC machines.

(b) What is requirement of Database management system in CIM?

(c) What do you mean by CAD/CAM integration? Explain application integration .

Q-5 **[11]**

(a) Explain Machine Control Unit in NC system.

(b) What are the various approaches available for CAPP? Explain in brief Retrieval type CAPP .

OR

Q-5 **[11]**

(a) What do you understood in CIM? Which type of Activities of CIM?

(b) Explain the open & close loop system in CNC machine tool.

Q-6 **Attempt Any Three** **[12]**

(a) Define manual part programming. What is meant by tool offset, tool length offset

and cutter diameter compensation?

(b) Explain following terms (a) JIT (b) MRP-I (c) MRP-II (d) ERP .

(c) Define DNC? Explain types of DNC machine tool.

(d) What is Network and Networking? Explain most usable type of network.

*********END OF PAPER*******

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