

M. Tech & Machine . Morning  
 30/05/14.

Exam No: \_\_\_\_\_

GANPAT UNIVERSITY

M.Tech.[ME(AMT)] Sem-II

REGULAR EXAMINATION JUNE-2014

3ME201 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) Explain initial phase of FMS Planning and implementation issues. [4]  
 (b) Consider the following machine-component incidence matrix with 10 machines and 5 components. Obtain the final machine-component cells using Rank Order Clustering Algorithm. [8]

	Component				
	1	2	3	4	5
Machine 1	1	0	0	1	0
2	1	0	0	1	0
3	1	0	0	1	0
4	1	0	0	0	0
5	1	0	0	1	0
6	0	1	0	0	1
7	0	1	0	0	1
8	0	1	1	0	1
9	0	0	1	0	1
10	0	0	1	0	1

OR

- Q-1 (a) A flexible manufacturing cell consists of three plus a load/unload stations. [8]

Part j	Part Mix Pj	Operation k	Description	Station i	Process Time $t_{ijk}$ (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	i	3
D	0.35	1	Load	i	4
		2	V.Mill	3	18
		3	Drill	4	8
		4	Unload	1	3

The load/unload station is stations 1 using two servers (material handling workers). Station 2

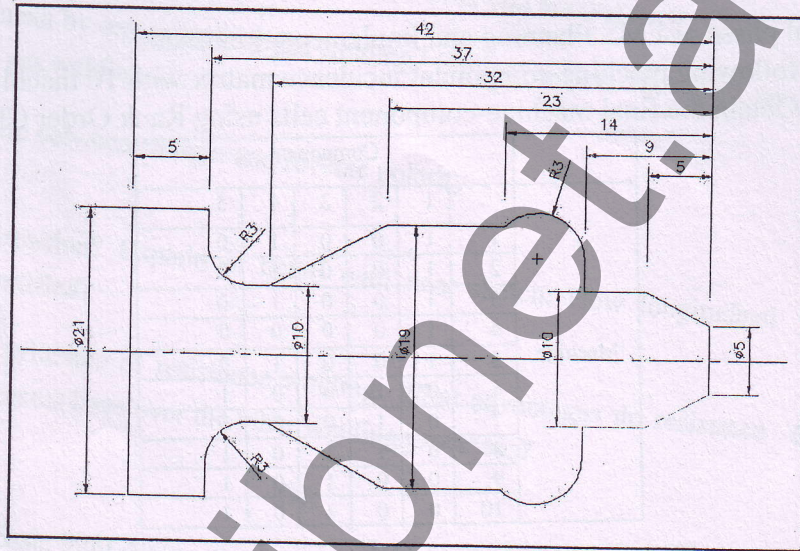


performs milling operations and consists of two server (two CNC milling machine). Station 3 performs vertical milling operations with three servers (three identical CNC vertical milling machine). Station 4 has two server that performs drilling (two CNC drill press). The three stations are connected by a part handling system that has two work carrier. 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, c) utilization of each machine in the system, and d) average utilization of system.

- (b) Differentiate i) single machine cell, ii) flexible manufacturing cells, iii) flexible manufacturing system. [4]

Q-2 [11]

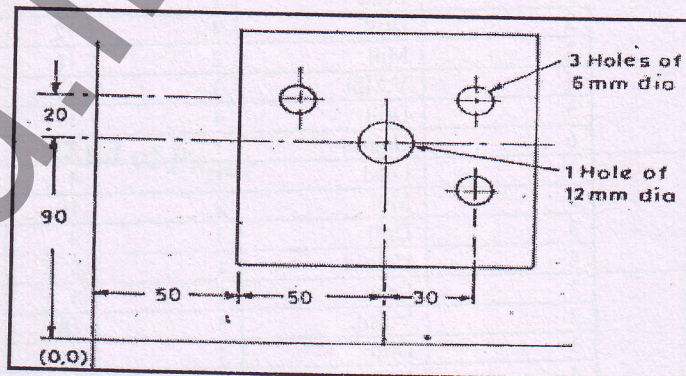
- (a) Write a program of CNC Turning Center for following component Raw Material Size:  $24\text{Ø mm} \times 45\text{ mm Long}$ .



- (b) What is AGV? Explain types of navigation used for AGV. OR

Q-2 [11]

- (a) What is material handling? Explain about equipments used for material handling.  
(b) Write a part program for PTP: Z level at 5 mm above the plate surface. And plate thickness = 10 mm. shown in fig.





Q-3

**Attempt Any three.**

[12]

- (a) Define manual part programming. What is meant by tool offset, tool length offset and Cutter diameter compensation?
- (b) Enlist the FMS Elements and explain about FMS layout.
- (c) What is ATC? Discuss types of ATC.
- (d) Define following terms of AGV 1) Guide path 2) Routing 3) Scheduling 4) Idle vehicle 5) Deadlock.

**SECTION-II**

Q-4

[12]

- (a) Why Communication matrix required in CIM? Explain in detail Communication matrix.
- (b) How Support system help in Manufacturing
- (c) Describe in brief CIM data exchange protocols

**OR**

Q-4

[12]

- (a) What do you mean by CAD/CAM integration? Explain application integration.
- (b) Explain Open System Interconnection (OSI) in Brief and How it is differ from TCP/IP.
- (c) Define MIS and explain its role in CIM.

Q-5

- (a) Explain LAN concept its importance and different protocol and types [6]
- (b) Explain Modulation and demodulation in communication and Communication through RS-232. [5]

**OR**

Q-5

- (a) Write short note on Synchronous versus Asynchronous communication and binary system for data coding. [6]
- (b) Define DNC? Explain types of DNC machine tool. [5]

Q-6

**Attempt Any three.**

[12]

- (a) List the various communication medium used in CIM environment with their characteristics.
- (b) Explain in very brief following terms i) data in communication ii) information in communication iii) Signals & signaling iv) Transmission.
- (c) Describe information system in Automated Factory.
- (d) A text book is 515 pages long, Each page contains on average of 25 lines, each line 10 words, If the word including blank space averages 7 characters, and How much storage capacity required storing this book?

\*\*\*\*\*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