Exam No: _____

GANPAT UNIVERSITY

B.TECH VIII SEM MECHATRONICS ENGINEERING

REGULAR EXAMINATION MAY-2014

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)** Discuss the various FMS layout configurations. **(4)**

(b) An FMS is used to produce three products. The FMS consists of a load/ Unload station, two automated processing stations, an inspection station, and an automated conveyor system with an individual cart for each product. The conveyor carts remain with the parts during their time in the system, and therefore the mean transport time includes not only the move time, but also the average total processing time per part. The number of servers at each station is given in the following table: **(8)**

Station	Description	Number of Servers
1	Load and Unload	2 Workers
2	Process X	3 servers
3	Process Y	4 server
4	Inspection	1 server
Transport System	Conveyor	8 carriers

All the parts follow of two routings, which are 1→ 2→ 3→ 4→ 1. or 1→ 2→ 3→ 1, The difference being that inspections at station 4 are performed on only one part in four for each product (Fijk = 0.25). The product mix and process times for the parts are presented in the table below:

Product j	Product Mix Pj	Station 1 (min)	Station 2 (min)	Station 3 (min)	Station 4 (min)	Station 1 (min)
A	0.2	5	15	25	20	4
B	0.3	5	10	30	20	4
C	0.5	5	20	10	20	4

The move time between stations is 4 min. a) using the bottleneck model, show that the conveyor system is the bottleneck in the present FMS configuration, and determine the overall production rate of the system: b) Determine how many carts are required to eliminate the conveyor system as the bottleneck, c) With the number of carts determined in (b), use the extended bottleneck model to determine the production rate for the case when N=8 that is, only eight parts are followed in the system even though the conveyor system has a sufficient number of carriers to handle more than eight.

OR

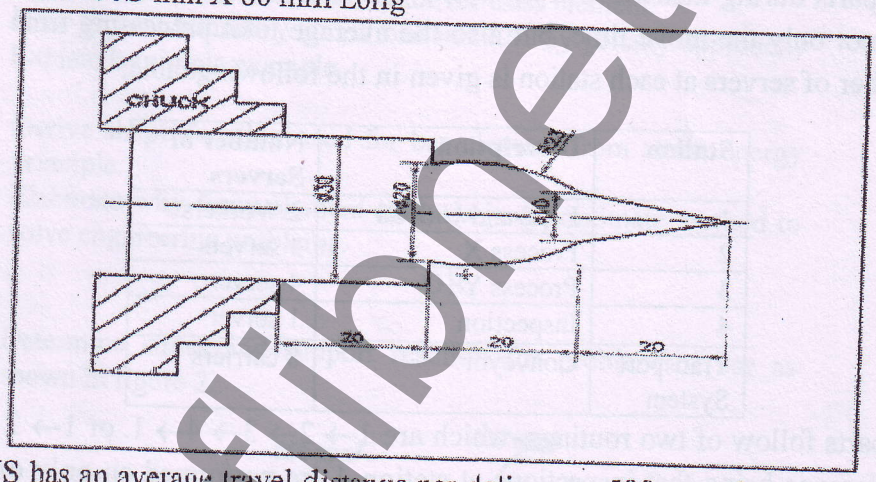
Q-1 (a) What is GT? Why group technology more important in the present manufacturing scenario? [6]

(b) Consider the following machine-component incidence matrix with 5 machines and 5 components. Obtain the final machine-component cells using Bond Energy Algorithm. [6]

		Component(j)				
		1	2	3	4	5
Machine (i)	1	0	1	1	0	1
	2	1	0	0	1	1
	3	0	0	1	0	0
	4	1	0	0	1	0
	5	1	0	0	0	1

Q-2

(a) Write a program of CNC Turning Centre for following component shown in fig Raw Material Size : 30Ø mm X 80 mm Long [5]

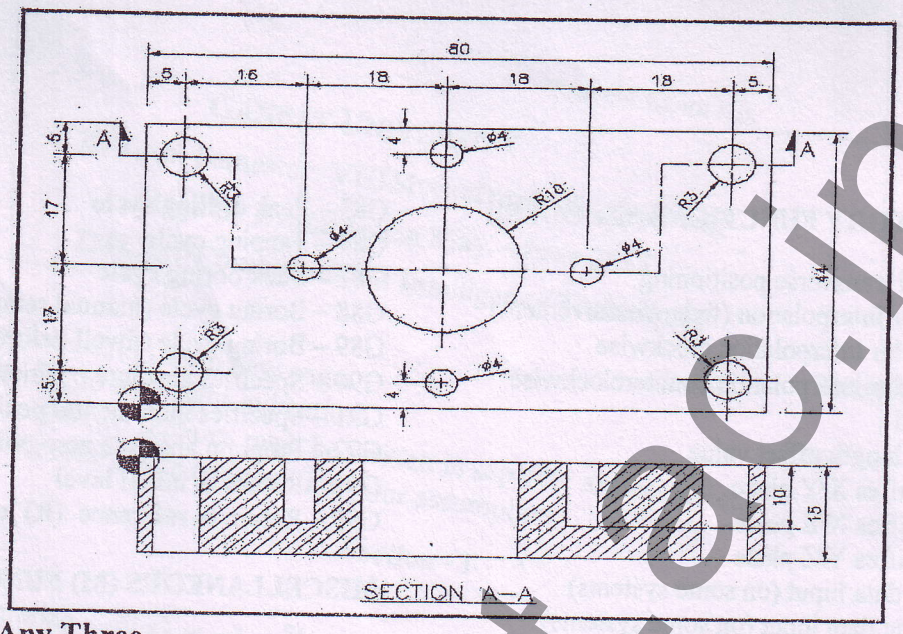


(b) An AGVS has an average travel distance per delivery = 500 m and an average empty travel distance = 300m. The system must make a total of 75 deliveries per hour. The load and unload times are both 0.5 min and the speed of the vehicles = 150 m/min. The traffic factor for the system = 0.85. Determine the average total time per delivery, the handling system efficiency and the resulting average number of deliveries per hour for a vehicle. How many vehicles are needed to satisfy the indicated deliveries per hour? [6]

OR

Q-2 (a) What is material handling? Explain about equipments used for material handling. [5]

(b) Write a CNC Machining Centre Program of given components. Raw Material size: 85 mm X50 mm X 15 mm. [6]



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

(a) What is AGV? Explain AGV systems

(b) What is flexibility? Discuss different flexibility of FMS.

(c) What are the various approaches available for CAPP?

(d) What is AS/RS system? Explain types of AS/RS and its applications.

SECTION-II

Q-4 (a) What is Group Technology? What are the favorable conditions for Applying GT? Explain the benefits of Group Technology with their area of application. **[4]**

(b) What do you understood in CIM ? Which type of Activities of CIM? **[4]**

(c) What is numerical control? Explain function objective and application of numerical control machine tool along with suitable example **[4]**

OR

Q-4 (a) Explain the nature and role of the elements of CIM system in brief. **[4]**

(b) Explain the open & close loop system in CNC machine tool. **[4]**

(c) What is FMS? What are the basic components of FMS? Give benefits of FMS. **[4]**

Q-5 (a) What is DNC? Discuss its components. Give its advantages and disadvantages. **[5]**

(b) Explain following terms (a) JIT (b) MRP-I (c) MRP-II (d) ERP **[6]**

OR

Q-5 (a) Explain Machine Control Unit in NC system. **[5]**

(b) What is Adaptive control machining system? Explain types of adaptive control machining system. **[6]**

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

(a) What is a Flexible Manufacturing system? What renders it so flexible?

(b) Explain classification of DBMS.

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

(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