

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Summer 2018 Examination

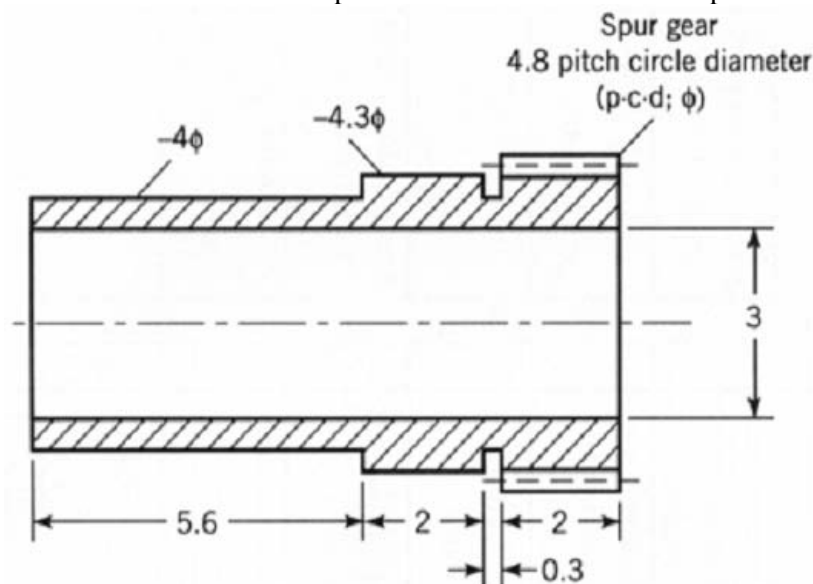
Semester: 2
Subject Code: 03218182
Subject Name: Flexible Manufacturing System

Date: 28/05/2018
Time: 2.00 pm to 4.30 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.
5. Use of form code table is allowed.

- Q.1** A) What is a focused factory? What is the basis on which focused factories are formed? **(05)**
- B) Write a short note on CAPP. What are its benefits and types? **(05)**
- C) What are the objectives and benefits of simulation in manufacturing industries? List various simulation packages. Briefly explain any one type of package. **(05)**
- Q.2** **Answer the following questions.** (Attempt any three) (Each five mark) **(15)**
- A) Explain in brief any one type of special purpose machine. What are its salient features?
- B) “It could arguably be said that simulation is more widely applied to manufacturing systems than to any other application area”. Justify the above statement with proper reasons.
- C) Write a short note on AGV’s guidance system. Explain various types of guidance systems.
- D) The following are the data of the AGV system.
 Vehicle velocity: 45 m/min,
 Pick up time: 45 s,
 Average distance travelled/delivery: 135 m,
 Drop off time: 45 s,
 Traffic factor: 0.9,
 Average distance traveling empty: 90 m
 Determine the number of vehicles required to satisfy the delivery demand of 40 delivers per hour.
- Q.3** A) Write a short note on CIM? Draw the CIM hierarchy chart and explain each level briefly. **(07)**
- B) Given the rotational part design below, determine the form code in the Optiz parts classification and coding system. Use the form code table provided for assistance. Also explain each step in detail. **(08)**



OR

B) Design an assembly line for the following elements. Balance the line by rank positional weight (08) method. T_C is given as 18min. Also find line efficiency, balance delay and smoothness index.

Tasks	Task Time (Min.) T_i	Preceded by
1	8	-
2	3	1
3	3	1
4	3	1
5	6	2
6	7	4
7	5	3,5,6
8	3	7
9	2	7
10	5	7
11	8	8
12	5	10
13	10	9,11,12
	TWC=68	

Q.4 A) Compare the Flexible manufacturing system with conventional manufacturing systems. Write (07) down the benefits and limitations of FMS.

OR

A) A four-workstation cell with one worker has single-cycle machines to perform all operations. The (07) walk time around the cell is 60 seconds. The times (in seconds) for the machine operating cycles and setup (unload, changeover, load and start machines) are listed below.

	Machines			
	A	B	C	D
Operating Cycle(Sec)	152	173	175	190
Setup (Sec)	23	31	52	28

The cell produces different kinds of parts continuously, one unit at a time.

- What are the actual cell cycle time and cell capacity per day (number of working hours 8 per day)?
- What is the required cycle time when the demand per day is 140 units? Can a cell cycle time of 215 sec. meet this required cycle time? Discuss where in the cell you would have to make changes to achieve this cycle time. Discuss alternatives or possible actions for making the changes.

B) A manufacturing system is producing 7 products. The route sheet of the products is given below. (08) For the data given,

- Determine the Jacard's similarity between machines (processes).
- Suggest possible groups of machines. Use single linkage clustering procedure.

Machine	Part						
	1	2	3	4	5	6	7
1	1	1	0	0	1	0	1
2	0	0	1	1	0	1	0
3	1	1	1	0	1	1	1
4	0	0	0	1	0	0	1
5	0	0	1	1	0	0	0
6	1	1	0	0	0	1	0

FORM CODE TABLE:

Digit 1		Digit 2		Digit 3		Digit 4		Digit 5											
Part class		External shape, external shape elements		Internal shape, internal shape elements		Plane surface machining		Auxiliary holes and gear teeth											
Rotational parts	0	$L/D \leq 0.5$		0		Smooth, no shape elements		0		No hole, no breakthrough		0		No surface machining		0		No auxiliary hole	
	1	$0.5 < L/D < 3$		1		No shape elements		1		Surface plane and/or curved in one direction, external		1		Axial, not on pitch circle diameter					
	2	$L/D \geq 3$		2		Thread		2		External plane surface related by graduation around the circle		2		Axial on pitch circle diameter					
	3			3		Functional groove		3		External groove and/or slot		3		Radial, not on pitch circle diameter					
	4			4		No shape elements		4		External spline (polygon)		4		Axial and/or radial and/or other direction					
	5			5		Thread		5		External plane surface and/or slot, external spline		5		Axial and/or radial on PCD and/or other directions					
Nonrotational parts	6			6		Functional groove		6		Internal plane surface and/or slot		6		Spur gear teeth					
	7			7		Functional cone		7		Internal spline (polygon)		7		Bevel gear teeth					
	8			8		Operating thread		8		Internal and external polygon, groove and/or slot		8		Other gear teeth					
	9			9		All others		9		All others		9		All others					