

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: M.Tech.
BRANCH: MECH

SEMESTER : II
SESSION : SP/25

SUBJECT: ME515R1 COMPUTER INTEGRATED MANUFACTURING

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.
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|---|-------|----|
| Q.1(a) State and explain any five reasons why industries opt for automation. How does automation contribute to overall process improvement? | [5] 1 | 4 |
| Q.1(b) Discuss how computer-based integration helps in coordinating manufacturing with sales, design, materials management, shop floor activities, and process monitoring. Provide suitable examples. | [5] 1 | 5 |
| Q.2(a) What are work part transfer mechanisms? Compare continuous, intermittent, and asynchronous transfer systems with examples. | [5] 2 | 4 |
| Q.2(b) A manufacturing company needs to assemble a product consisting of 8 tasks with the following task times and precedence relationships: | [5] 2 | 3 |

Task Time (seconds) Immediate Predecessor

A	10	-
B	8	A
C	6	A
D	5	B, C
E	4	C
F	7	D
G	6	D
H	5	E, F

The company wants to design an **assembly line** with a cycle time of **15 seconds** per workstation.

Questions:

1. Calculate the **theoretical minimum number of workstations** required.
 2. Compute the **line efficiency** based on your solution.
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|--|-----|---|---|
| Q.3(a) Discuss the key industrial applications of Flexible Manufacturing Systems. What are the major benefits of implementing FMS in a production environment?{(| [5] | 3 | 3 |
| Q.3(b) Describe the design considerations for an Automated Storage and Retrieval System (AS/RS). How does it contribute to inventory and space optimization? | [5] | 3 | 6 |
| Q.4(a) What are the advantages of group technology in manufacturing? | [5] | 4 | 4 |
- While analyzing the production flow of ABC company, it is observed that 5 different parts/components are complexly involved in processing at 5 different machines. Part-Machine Incidence Matrix for the Production Flow Analysis for the same is given below

	P101	P104	P105	P107	P108
M2	1				
M7		1			1
M13	1			1	
M13A		1	1		
M15				1	

Find logical part families and machine groups based on Part-Machine Incidence Matrix to showcase machine-part grouping using Rank Order Clustering Algorithm.

- Q.4(b) Why should industries adopt automated inspection systems? [5] 4 3
Discuss the applications of RFID in manufacturing.
- Q.5(a) Describe the components of a data communication system. [5] 5 2
Q.5(b) What is the significance of Open Systems Interconnection (OSI)? Enlist and define the layers [5] 5 2
described in OSI model?

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