

IV B.Tech I Semester Regular Examinations, November 2005
PRODUCT DESIGN AND ASSEMBLY AUTOMATION
(Mechatronics)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Discuss the salient aspects considered in performance of an orienting device. [8]
(b) Derive the limiting condition for the part to leave the tract for sufficiently large amplitude. [8]
2. (a) Write about rotary centerboard hopper feeder. [8]
(b) Discuss about tumbling-barrel hopper feeder. [8]
3. (a) Explain about ratchet and pawl mechanism. [8]
(b) Explain the advantages of Belt-driven transfer system over chain driven transfer system. [8]
4. (a) List out the favourable points to be considered in automatic handling of product. [8]
(b) List out the benefits of automation of product design. [8]
5. (a) What are the three main phases of the design process. [8]
(b) Define assembly efficiency. What are the different types of criteria to be met by assembly efficiency. [8]
6. Discuss briefly the effect of part thickness and part size on handling time. [16]
7. (a) Discuss the important consideration for points of contact on chamfer and hole. [8]
(b) What are the conclusions drawn from effects of chamfer design on insertion operation. [8]
8. Briefly discuss the effect of parts quality on downtime. [16]

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1. (a) Sketch and explain spiral elevators. [8]
(b) Sketch and explain the Balanced vibratory feeder. [8]
2. (a) How the productivity of manufacturing is increased by application of automatic assembly? [8]
(b) Discuss the historical development of the assembly process. [8]
3. (a) Differentiate between synchronous and asynchronous work transfer system. [8]
(b) Discuss application of Geneva Mechanism . [8]
4. (a) List out the favourable points to be considered in automatic handling of product. [8]
(b) List out the benefits of automation of product design. [8]
5. What are the important consideration to be considered by the designers of a manual assembly line. [16]
6. Discuss the two most commonly used systems used in time measurement for part handling manually. [16]
7. (a) Sketch and explain the design concepts to provide easier access during assembly. [8]
(b) Discuss the three conditions drawn between penalty time and basic time. [8]
8. What are the machine design factors to be considered to reduce machine downtime due to defective parts. [16]

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1. (a) Sketch and explain spiral elevators. [8]
(b) Sketch and explain the Balanced vibratory feeder. [8]
2. (a) What are the advantages of automatic assembly? [8]
(b) How the productivity of manufacturing company is increased by application of automatic assembly. [8]
3. (a) Discuss with neat diagram the mechanism of rotary indexing machine. [8]
(b) A rotary worktable is driven by a Geneva mechanism with six slots. The driver rotates at 100 r pm. Determine, cycle time, available process time and indexing time each cycle. [8]
4. Discuss with sketches the features that are added deliberately for alignment. [16]
5. List out the simple rules to be considered in designing of produce and parts in automatic assembly. [16]
6. (a) List out the features affecting manual handling time significantly. [8]
(b) Explain briefly the classification system for first digit in assemblycode in manual handling process. [8]
7. (a) Deduce the empirical expression to estimate the manual insertion time. [8]
(b) Sketch and explain the kinematic design principles in manual assembly. [8]
8. (a) Derive the governing equation for the total downtime on any workhead while machine produces N assemblies. [8]
(b) Discuss the theoretical effect of buffer storage size on proportion of down for several free-transfer machines. [8]

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1. Define load sensitivity and explain solution to load sensitivity. [16]
2. (a) What are the general important considerations for choice of assembly Methods?. [8]
- (b) What are the advantages of automatic assembly? [8]
3. (a) How can you classify a system as an automated assembly system? Justify. [8]
- (b) Explain about ratchet and pawl mechanism. [8]
4. (a) Define maximum feed rate and list out the factors that affect the magnitude of feed rate. [8]
- (b) why automatic feeding and orientating methods are applicable only to small parts. Justify with any two suitable example. [8]
5. List out the simple rules to be considered in designing of produce and parts in automatic assembly. [16]
6. (a) What meant by the term MTM in time measurement system. Discuss the types of orientations considered in MTM. [8]
- (b) List out the design features that significantly affect manual fastening times. [8]
7. Explain with suitable sketches the effect of holding down on insertion. [16]
8. (a) Sketch and explain the graphic showing cost of assembly versus effect of quality of parts level on assembly costs. [8]
- (b) What are the effects of parts quality on production time? [8]
