$\mathbf{R07}$

IV B.Tech I Semester Examinations, May 2011 PRODUCT DESIGN AND ASSEMBLY AUTOMATION **Mechatronics**

Time: 3 hours

Code No: 07A71402

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks ****

- 1. What are the reasons for jamming in assembly system and mention the methods for avoiding. [16]
- (a) What are the uses of study of balanced feeder 2.
 - (b) Explain with neat sketch of a recirculating vibratory feeder [8+8]
- (a) Explain the working principle of rotary disc feeder with neat sketch. 3.
 - (b) List out the advantages of Rotary disc feeder. [10+6]
- (a) Differentiate between intermittent transfer and asynchronous (or) power and 4. free Transfer
 - (b) Explain the rack and pinion with ratchet and pawl mechanism. [10+6]
- 5. Define the term total angle of symmetry. Discuss the effect of total angle of symmetry on the time required to handle a part. 16
- 6. (a) Derive an expression for dimensionless assembly cost per part of automation equipment.
 - (b) Discuss about plant efficiency. [10+6]
- 7. Explain the general important considerations for choice of assembly methods. [16]
- 8. Explain classification of first digit of geometrical classification of parts for automatic handling and mention the part features. 16

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- 1. Differentiate between Geneva mechanism and cross over cam mechanism in assembly process. [16]
- 2. (a) What are the various feeding systems used in practice and explain about the construction and working of a feeder.
 - (b) What are the uses of study of vibratory bowl feeder [8+8]
- 3. Explain with suitable sketches the effect of holding down on insertion process. [16]
- 4. (a) Write short notes on Magazines
 - (b) Mention the advantages and disadvantages of magazines. [10+6]
- 5. (a) What are the advantages of automatic assembly.
 - (b) How the productivity of manufacturing company is increased by application of automatic assembly. [8+8]
- 6. Derive an expression of proportion down time for free transfer machines and list out the values of buffer storage capacity b on the basis of factor k. [16]
- 7. How the accuracy and reliability ensured by using robots in the high speed automatic insertion. [16]
- 8. How the manual assembly database is created and implemented for efficient working. Explain it. [16]

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[4+4+4+4]

[16]

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- 1. Explain the profile of typical candidate assembly in robot systems. [16]
- 2. Sketch and explain the following in holding down, during their assembly
 - (a) parts self locating and pre aligned.
 - (b) easy to align parts.
 - (c) not easy to align parts.
 - (d) realignment and difficult to design parts.

3. Enumerate the reasons for automation and explain it.

- 4. (a) What are the various types of indexing machines? Explain the construction and working principle of rotary and inline indexing machines.
 - (b) Mention the specific advantages of rotary and inline indexing machines.[8+8]
- 5. How do you estimate the mean conveying velocity of a part in vibratory bowl feeder by using graphs. [16]
- 6. (a) List out the parts that require tweezers in manual assembly process.
 - (b) What are the uses of study of effect of weight on handling time. [8+8]
- 7. (a) How do you estimate the assembly costs in robot assembly system.
 - (b) Explain about multi station with robots, special purpose work heads, and manual assembly stations as appropriate. [8+8]
- 8. Sketch and explain the construction and working of magnetic disk feeder. [16]

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8 + 8

[16]

Answer any FIVE Questions All Questions carry equal marks ****

- 1. Explain the following for single station robot systems.
 - (a) Personnel costs
 - (b) Part quality
- 2. Derive the condition to avoid jamming of parts in Reciprocating tube hopper feeder.
- 3. Explain the advantages and disadvantages of manual assembly data sheets in assembly process. [16]
- 4. Write about advantages and disadavantages of Fixed automation. [16]
- 5. (a) Mention the reasons for stoppages of assembly process.
 - (b) sketch and explain walking beam transfer system used in automated floe lines. [8+8]
- 6. Derive the relation between normal track acceleration (A_n) to normal acceleration due to gravity (g_n) for forward sliding of work part in mechanics of conveying in vibratory bowl feeder. [16]
- 7. (a) Mention the various types of robot assembly systems.
 - (b) Explain about single station systems with suitable diagrams. [6+10]
- 8. Explain Alpha and Beta rotational symmetries for various parts and also determine the total angle of symmetry for that parts. [16]
