

**IV B.Tech. II Semester Supplementary Examinations, July -2005**  
**AUTOMATION IN MANUFACTURE**  
**(Production Engineering)**

**Time: 3 hours**

**Max Marks: 80**

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

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1. (a) Explain different types of automated production systems.  
(b) Explain different control functions which are used in automated flow line.
2. (a) Explain In-line and rotary type automated flow lines with examples.  
(b) An 8-station rotary indexing machine operates with an ideal cycle time of 20sec, the frequency of line stop occurrences is 0.06 stops/cycle on the average. When a stop occurs it takes an average of 3min to make repairs. Determine the following
  - i. Average production time
  - ii. Line efficiency
  - iii. Proportion of down time.
3. (a) State the principles of material handling system.  
(b) Explain the working principle of AGVS. State their applications.
4. (a) Discuss the factors affecting the selection of material handling equipment in automation.  
(b) Explain the basic components of automated storage and retrieval system.
5. (a) Sketch and explain adaptive control with optimization and state their applications.  
(b) What are the advantages of adaptive control? Under what conditions A.C is recommended.
6. (a) Sketch and explain working principle of stereo lithography technique.  
(b) Explain various logistics used in BPRE.
7. (a) Distinguish between programmable automated and flexible automation.  
(b) Explain with the aid of mathematical model, the difference in scope between automation and CIM.
8. Write short notes on any three of the following:
  - (a) Hydraulic component circuits
  - (b) Buffer storages
  - (c) Concurrent engineering
  - (d) Line balancing.

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1. (a) Distinguish between:
  - i. mechanisation and Automation
  - ii. Flexible automation and CIM(b) Sketch and explain various linear transfer mechanisms.
2. (a) Explain various design and fabrication factors which are considered in automated flow lines.  
(b) Explain the importance of Buffer storages in automated flow lines.
3. (a) Distinguish between synchronous transfer system and Asynchronous transfer system.  
(b) Sketch and explain elements of the parts delivery system at an assembly work station.
4. (a) Classify various types of material handling systems and state their applications.  
(b) Explain the path guidance technologies in AGVS.
5. (a) A roller conveyer moves tote pans in a single direction at a speed of 70m/min. between the load station and unload station. The distance between the two stations is 160m. The time interval required between loading cycles at the load station is 1.0min and the time interval between unloading cycles at the unload station is 0.8min. The unit load on a tote pan consists of 18 parts. Determine the following.
  - i. Total transport work for the handling system.
  - ii. Flow rate of parts on the conveyor system.(b) State the applications of AS/RS system.
6. (a) Define the term index of performance (IP) in Adaptive control and explain a typical Adaptive control machining system that uses temperature as the measured process variable.  
(b) Explain the advantages of Adaptive control system.
7. (a) Sketch and explain working principle of rapid prototyping process.  
(b) State the applications of business process Re-engineering.
8. Write short notes on any THREE of the following

- (a) Manual assembly system
- (b) Interfacing handling and storage with manufacturing.
- (c) Traffic control and safety in AGV system.
- (d) Automation strategies.

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1. (a) Explain different types of automation strategies.  
(b) Explain different work park transport systems in automated flow lines.
2. (a) Analyse a automated flow line without storage by using upper and lower bound approach methods.  
(b) Write short notes on:
  - i. Flexible manual assembly systems
  - ii. Automated assembly systems.
3. (a) Define AS/RS system. Explain different types of AS/RS systems with applications.  
(b) An automated guide vehicle system (AGVS) has an average travel distance per delivery =150meters and an average empty travel distance = 100meters. The system must make a total of 75 deliveries/hr. the load and unload times are both 0.5min and the speed of the vehicle = 50m/min. the traffic factor for the system =0.85. Determine
  - i. Average total time per delivery
  - ii. The handling system efficiency
  - iii. Average no. of deliveries per hr/vehicle.
4. (a) Explain with block diagram the typical adaptive control machining system that uses cutting force as the measured process variable.  
(b) Distinguish between ACO and ACC.
5. (a) Explain the role of BPPE in CIM.  
(b) What is concurrent engineering? Explain in detail.
6. (a) State and explain the objectives of the material handling system.  
(b) Write short roles on:
  - i. Conveyors
  - ii. AGVS.
7. (a) State and explain various line balancing methods.  
(b) State the design principles for development of the automated assembly.

8. Write short notes on any THREE of the following

- (a) Fixed Automated
- (b) Techniques of rapid proto typing
- (c) Configuration of BPE
- (d) Automation in machine tools.

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1. (a) Explain the various levels of automation in factory operations.  
(b) What are the various workflow configurations. Explain with simple sketches.
2. Analyse a two stage transfer line with storage buffers.
3. Explain the hardware elements of a parts delivery system with a simple sketch.
4. (a) Explain the concept of automated storage and retrieval systems (AS/RS). What are its various types.  
(b) Differentiate between an AS/RS and a carousel storage system.
5. (a) What is Adaptive control? What are the various types of Adaptive control?  
(b) How do you convert a CNC lathe into an Adaptive control system which can measure cutting force and control the feed?
6. (a) What is Rapid prototyping? What are its types?  
(b) Explain any one method of Rapid prototyping with a neat sketch.
7. Explain any two of the following:
  - (a) Flexible assembly lines
  - (b) Business process Re-engineering
  - (c) Automation in machine tools
8. Explain any two of the following:
  - (a) Pneumatic actuators
  - (b) Concurrent engineering
  - (c) Automated guided vehicle systems

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