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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Automobile Engineering

Semester End Examination; July - 2021

Computer Integrated Manufacturing

Time: 3 hrs

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What is automation? Explain different types of automation. 8
- b. Explain the following terms:
 - i) Manufacturing lead time
 - ii) Production rate 6
 - iii) Production capacity
- c. A lathe in an industry is used for 60 hrs/week, which is its full capacity. Its production rate is 30 units/hr. However, due to a lower demand, the lathe was kept idle for some time and only 1500 units were produced. Determine the production capacity of the machine tool and its utilization during the low demand week. 6
- 2 a. Explain the various methods of work part transport in an automated flow line. 9
- b. With the aid of sketches, explain any two rotary transfer mechanisms. 6
- c. A rotary work table is indexed by a Geneva wheel mechanism. The Geneva wheel has 6 slots and the driver rotates at 15 rpm. Determine the cycle time, dwell (Processing) time and the time loss in indexing operation. 5
- 3 a. Enumerate the objectives of automated flow lines. 8
- b. Discuss the reasons for implementing buffer storage. 4
- c. A 10-static transfer line has ideal cycle time of 45 sec. The frequency of line stops is 0.08 stops/cycle, when a line stop occurs, it takes an average of 5 min to repair the problem. Parts are not removed from the workstations during the down time. The different cost elements associated are;

Raw work part cost = Rs. 60/pc

Line operating cost = Rs. 800/hr 8

Cost of disposable tooling = Rs. 6/pc

Determine;

 - i) Average production rate in pc/hr
 - ii) Line efficiency
 - iii) Proportion of downtime
 - iv) Average cost per piece
- 4 a. Explain the upper bound approach and lower bound approach in analyzing transfer lines, without storage buffer. 8
- b. Discuss the steps in assembly line balancing. 4

- c. A product with total work content time of 47.5 min is to be assembled on a manual assembly line. The production rate required is 30 units per hour. The manning level is expected to be 1.25, proportion uptime is 0.95, and repositioning time is 6 sec. Determine;
- i) Cycle time 8
 - ii) Ideal minimum member of workstations
 - iii) If the ideal number in (ii) is achieved, how many workstations are required?
 - iv) Station or service time.
- 5 a. Discuss the principles used in product design to facilitate automated assembly. 6
- b. With neat figures, explain the elements of part delivery system. 8
- c. Discuss the functions that are performed while operating AGVS. 6
- 6 a. Discuss the different types of material handling equipments. 10
- b. Explain the analysis of Multi-station assembly systems. 10
- 7 a. With the help of a block diagram, explain the working of retrieval type CAPP system. How is it different from generative CAPP approach? 10
- b. With the help of a block diagram of structure of MRP system, explain the working of material requirement planning system. Also discuss the benefits of computerized MRP system. 10
- 8 a. Explain minimum rational work elements and precedence constraints. 6
- b. Explain Kilbridge and Wester's method. 6
- c. Explain the following:
- i) Material requirement planning 8
 - ii) Capacity planning
- 9 a. Discuss the basic components of NC system. 8
- b. Sketch and explain, the common robot configurations. 12
- 10 a. Describe salient features of CNC systems. 8
- b. Illustrate six degree of freedom of a polar robot with the help of a neat sketch. 9
- c. Discuss the robot applications in ARC welding. 3

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