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

(An Autonomous Institution affiliated to VTU, Belgaum)

Seventh Semester, B.E.–Mechanical Engineering

Semester End Examination; Dec. - 2014

### Computer Integrated Manufacturing

Time: 3hrs

Max.Marks: 100

*Note: Answer any FIVE full questions, selecting at least TWO full questions from each part.*

#### PART – A

1. a. Explain the types of automation technology. 10
- b. The average part produced in a certain batch manufacturing plant must be processed sequentially through six machines on an average. Twenty new batches of parts are launched each week. Average operation time = 6 mins; average setup time = 5 hrs; average batch size = 25 parts and average non-operation time per batch = 10 hrs/machine. There are 18 machines in the plant working in parallel. The plant operates on an average of 70hrs/week. Determine i) MLT for an average part ii) Plant capacity iii) Plant utilization iv. Work – in – process and v. Work – in – process ratio. 10
2. a. What do you understand by an automated flow line? Explain it with the help of a neat sketch and also list the objectives of automated flow line. 10
- b. Explain the following transfer mechanisms in automated flow line :
  - i) Walking beam transfer bar system 10
  - ii) Geneva mechanism.
- 3.a. A 22 – station in – line transfer machine has an ideal cycle time of 0.35 min. Station breakdown occurs with a probability  $P = 0.01$ . Average downtime = 8.0 min per line stop. Use the upper bound approach to determine,
  - i) Ideal production rate 12
  - ii) Frequency of line stops
  - iii) Actual production rate and
  - iv) Line efficiency.

Also, use lower bound approach to determine the above parameters.
- b. What are the reasons for downtime in an automated production line? 8
- 4.a. Explain the following terms in Line Balancing,
  - i) Minimum rational work element 8
  - ii) Total work content
  - iii) Cycle time
  - iv) Balance delay.
- b. The following data gives the precedence relationship and element times for a new product. 12

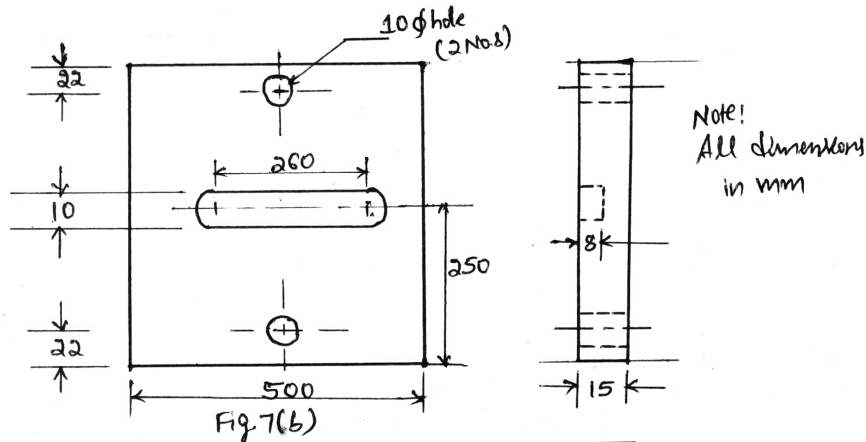
Element	Te (min)	Immediate predecessor
1	1.0	-
2	0.5	-
3	0.8	1,2
4	0.3	2
5	1.2	3
6	0.2	3,4
7	0.5	4
8	1.5	5,6,7

Using largest candidate rule method,

- i) Construct the precedence diagram for this job.
- ii) If the ideal cycle time is to be 1.5min, What is the minimum number of work stations required?
- iii) Calculate the balance delay.

**PART – B**

- 5.a. Explain the elements of part delivery system. Illustrate them schematically. 10
- b. What is an AGV? What are its types and applications? 10
- 6. a. Explain retrieval and Generative type CAPP system. 10
- b. What is MRP? Explain the structure of a MRP system. 10
- 7. a. Explain the salient features of horizontal and vertical axes machining centre and list their applications. 10
- b. Prepare the manual part program for CNC machining of a slot and holes in a mild steel plate as shown in Fig. 7(b). Assume suitable data for machining parameters and toolings. Indicate the datum and meanings of G and M codes used in the program. 10



- 8. a. With neat sketches, explain the four basic configurations of industrial robots. 12
- b. Describe 'end effectors' and 'sensors' with respect to robots. 8