

Anna University Chennai
Department of Industrial Engineering
End Semester Examination, Nov 2011
Fifth Semester B.E. Industrial Engineering, R2008
IE 9305 : Manufacturing Automation

23

Time : 3 Hrs

Max. Marks : 100

*(use of interest tables permitted)***Part A (10*2=20)**

1. What are the features of programmable automation?
2. A production machine is operated 65 h/week at full capacity. Its production rate is 20 units/h. During a certain week, the machine produced 1000 good parts and was idle the remaining time. What was the utilization of the machine during the week under consideration?
3. What is an electric actuator?
4. What are the different types of data present in a CNC system.
5. Differentiate fixed zero Vs floating zero in NC programming?
6. How adaptive control acts as optimal control in machining.
7. Provide the quantitative analysis of carousal storage system.
8. What are the applications of automatic data capture in non-manufacturing?
9. What are the functional areas performed by a modern computer –aided design system?
10. What is the 'ground rules' considered in designing graphics software?

Part B (5*16=80)*(each sub division carries 8 marks)*

- 11.i) Explain about the computer – process interface.
- ii) In the manual operation of a sheet metal stamping press, a two button safety interlock system is often used to prevent the operator from inadvertently actuating the press while his hand is in the die. Both buttons must be depressed to actuate the stamping cycle. In this system, one press button is located on one side of the press while the other button is located on the opposite side. During the work cycle the operator inserts the part into the die and depresses both pushbuttons, using both hands. (a) Write the truth table for this interlock system. (b) Construct the logic network diagram for the system. (c) Construct the ladder logic diagram for the system.

12 a i) Explain the automation strategies.

ii) The break-even point is to be determined for two methods of production, a manual method and an automated method. The manual method requires two operators at \$9.00/h each. Together, they produce at a rate of 50 units/h. The automated method has an initial cost of \$125,000, a 4-year service life, no salvage value, and annual maintenance costs of \$3000. No labor (except for maintenance) is required to operate the machine, but the machine consumes energy at the rate of 50 KW when running. Cost of electricity is \$0.05/KWh. If the production rate for this automated machine is 200 units/h, determine the break-even point for the two methods if a 25% rate of return is required.

(OR)

12.b.i) Explain the different types of interest rates used in production economics.

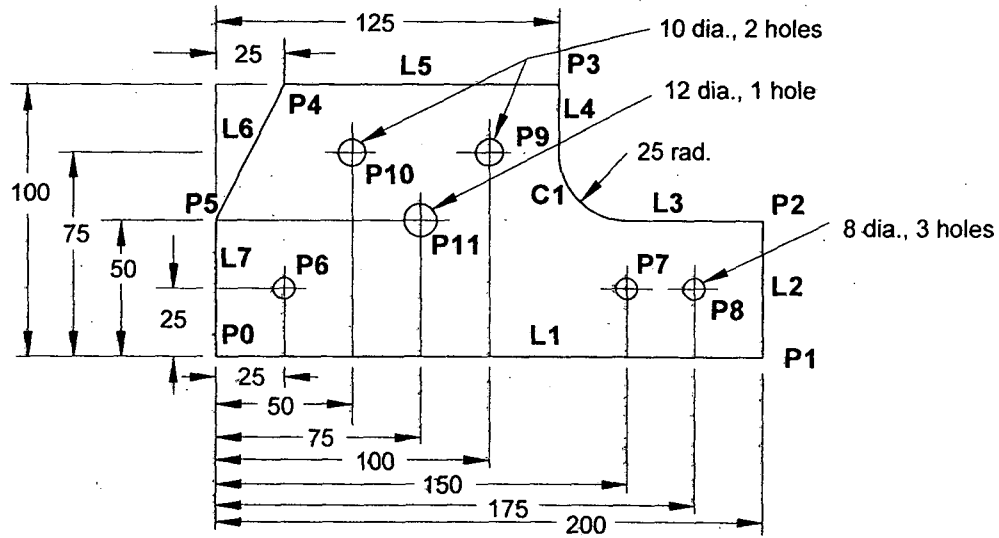
ii) The following data apply to the operation of a particular automated manufacturing system:

| | |
|--|-------------|
| Direct labor rate | = \$20.00/h |
| Number of operators required | = 2 |
| Applicable labor factory overhead | = 25% |
| Capital investment in system | = \$300000 |
| Service life | = 10 years |
| Salvage value | = \$30000 |
| Applicable machine factory overhead rate | =30% |

The system is operated one shift (2000 h/yr). Use a rate of return of 25% to determine the appropriate hourly rate for this man-machine system.

13.a.i) Explain about basic components in NC systems.

ii) Write the APT geometry statements to define the outline of the part in Figure shown. Use the lower left corner of the part as the origin in the x-y axis system.



(OR)

13.b.i) Explain about joints and links used to construct a robot manipulator.

ii) Describe the differences in orientation capabilities and work volumes for a :TR and a :RT wrist assembly. Use sketches as needed.

14.a.i) Explain about guidance and control of an AGVS.

ii) Analyze an AGVS for its system performance measure.

(OR)

14.b.i) Explain the basic components of AS/RS with a layout sketch.

ii) Explain bar code technology with its industrial applications.

15.a.i) Explain about the functions of a graphics package.

ii) Differentiate wire frame Vs solid modeling.

(OR)

15.b.i) Explain the types of solid modeling with example.

ii) Explain about 2D transformations of the graphic elements.