

4 a. Explain the following :

- i) Minimum rational work element
- ii) Precedence Diagram
- iii) Cycle time
- iv) Balance Delay

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b. The following list defines the precedence relationships and element Time for a new product:

Element	1	2	3	4	5	6	7	8	9	10
T_e (min)	0.5	0.3	0.8	0.2	0.1	0.6	0.4	0.5	0.3	0.6
Immediate Predecessor	-	1	1	2	2	3	4, 5	3, 5	7, 8	6, 9

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Construct the precedence diagram. If the ideal cycle time T_C is 1.0 min, What is the minimum number of stations required to balance the line?

PART - B

5 a. With neat sketches explain dial type assembly system and carousel automated assembly system.

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b. With neat sketch explain escapement and placement devices.

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6 a. Define CAPP. With block diagram explain variant type of CAPP.

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b. Briefly explain with block diagram various inputs to MRP system.

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7 a. With flow chart explain the steps involved in the development of a part program.

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b. Prepare the manual part program for the part shown in Fig. 7(b). Assume suitable data for machining parameters and tooling.

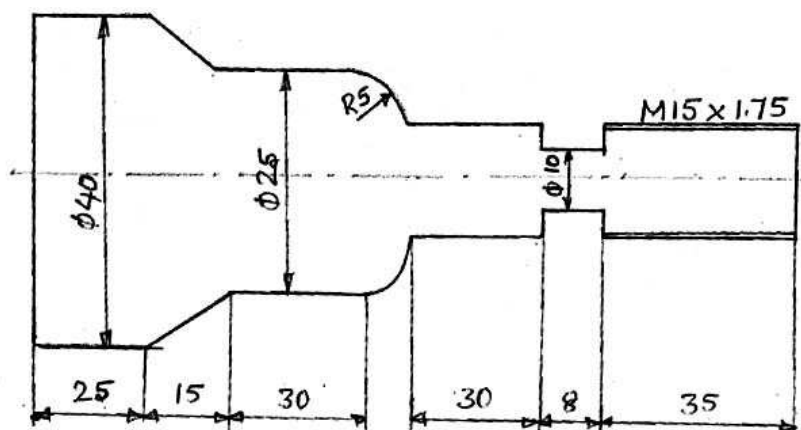


Fig.7(b) All Dimensions are in mm.

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8 a. With sketches explain Cartesian configuration and Spherical configuration of Robots.

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b. Explain the following :

- i) Types of Robot Motion
- ii) Robot Sensors

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