

Total No. of Questions : 4]

SEAT No. :

P9022

[Total No. of Pages : 2

Oct-22/TE/Insem-626

T.E. (Robotics & Automation)

**Elective - 1 : INDUSTRIAL ROBOTICS AND MATERIAL
HANDLING SYSTEMS**

(2019 Pattern) (Semester - I) (311505(A)-III)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates :

- 1) *Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4.*
- 2) *Figure to the right indicates full marks.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of Logarithmic Table, Slide rule is Electronic pocket calculator is allowed.*

Q1) a) Define Cranes. Enlist types of cranes. Explain any *two* types in details. [7]

b) What is the need of conveyor in manufacturing industries? Enlist and explain any *two* types of conveyors. [8]

OR

Q2) a) Explain various types of Monorails. [7]

b) A roller conveyor follows a pathway 35 m long between a parts production department and an assembly department. Velocity of the conveyor is 40 m/min. Parts are loaded into large tote pans, which are placed onto the conveyor at the load station in the production department. Two operators work the loading station. The first worker loads parts into tote pans, which takes 25sec. Each tote pan holds 20 parts. Parts enter the loading station from production at a rate that is in balance with this 25-sec cycle. The second worker loads tote pans onto the conveyor, which takes only 10 sec. Determine : [8]

- i) spacing between tote pans along the conveyor,
- ii) maximum possible flow rate in parts/min, and

P.T.O.

- iii) the minimum time required to unload the tote pan in the assembly department.
- iv) by how much be the conveyor speed be increased in order to increase the flow rate to 60 parts/min.

- Q3)** a) Explain the basic difference between Fixed Aisle Automated Storage/ Retrieval System (AS/RS) and Carousel System. [7]
- b) Explain in detail any *two* Automated Data Identification and Capture System. [8]

OR

- Q4)** a) Explain various types of Carousal Storage System. [7]
- b) Each aisle of a four-aisle AS/RS contains 60 storage compartments in the length direction and 12 compartments vertically, All storage compartments are the same size to accommodate standard size. Pallets of dimensions $x = 42$ in and $y = 48$ in. The height of a unit load $z = 36$ in. An S/R machine is used for each aisle with horizontal and vertical speeds of 200 ft/min and 75 ft/min, respectively. The S/R machine requires 20 sec to accomplish a P&D operation. Determine : [8]
- i) total unit loads can be stored in the AS/RS.
 - ii) the width, length, and height of the AS/RS using the allowances $a = 6$ in, $b = 8$ in and $c = 10$ in.
 - iii) the single-command and dual-command cycle times per aisle.
 - iv) through put per aisle under the assumptions that storage system utilization is 90% and the number of single-command and dual-command cycles are equal.

□□□