

Q.3 A) Classify the robots based on degrees of freedom and work volume. (07)

B) Write a short note on: (08)

(1) OPITZ coding system

(2) AGVs.

OR

B) Apply Rank Order clustering method to classify the following parts into part families and (08)
identify the corresponding machine cells:

| MACHINES | PARTS | | | | | | | | |
|----------|-------|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I |
| 1 | 1 | | | 1 | | | | 1 | |
| 2 | | | | | 1 | | | | 1 |
| 3 | | | 1 | | 1 | | | | 1 |
| 4 | | 1 | | | | 1 | | | |
| 5 | 1 | | | | | | | 1 | |
| 6 | | | 1 | | | | | | 1 |
| 7 | | 1 | | | | 1 | 1 | | |

Q.4 A) Explain different material handling equipment used in industries. (07)

OR

A) Compare Generative and Variant approach of Computer Aided Process Planning along with their (07)
relative advantages.

B) Describe various flexibility criterion used to define the level of flexibility in Flexible (08)
Manufacturing Systems. Use this criterion to explain Dedicated FMS and Random-order FMS.