Question 1

Six station dial indexing machine performs four assembly operations. The base is loaded at the station 1; the final product is unloaded at the station 6; and a component is attached at stations 2-5. The components are delivered by a hopper feeder to selector device for proper orientation. The system is designed with operating parameter given in the table below:-

Station	Assembly Time, Sec.	Feed Rate, f /min.	Selector, θ	q	m
2	4	32	0.25	0.010	1.0
3	7	20	0.50	0.005	0.6
4	5	20	0.20	0.020	1.0
5	3	15	1.00	0.010	0.7
Indexing Time, Sec		2.0			

When a component is jammed, it takes an average 2 min to release and start the system. The assembly machine failure is not significant and can be neglected. It is found that the system produces assemblies for below the designed average production rate. Analyze the problem, stating any assumption to determine the following:-

a) What is the designed average production rate?
b) What is the proportion of assemblies coming off the system that contain one or more defective component?
c) What seems to be the problem that limits the assembly system from achieving the expected production rate?
d) What is the actual production rate?

Question 2

Five station dial indexing machine performs four assembly operations, where a component is attached at stations 2-5. The base and final product is loaded and unloaded at the station 1. The components are delivered by a hopper feeder to selector device for proper orientation. The system is designed with operating parameter given in the table below :-

Station	Assembly Time, Sec.	Feed Rate, f /min.	Selector, θ	q	m
2	5	30	0.28	0.015	0.9
3	8	22	0.55	0.005	0.5
4	6	20	0.25	0.020	1.0
5	4	14	1.00	0.015	0.8
Indexing Time, Sec		2.0			

When a component is jammed, it takes an average 2.1 min to release and start the system. The assembly machine failure is not significant and can be neglected. The cost to operate the assembly machine is 200 SR/hr, and the cost of components being assembled is 2.4 SR/unit assemblies. Ignore other costs. Determine:-

(a) Yield of good assemblies,
(b) Average production rate of good assemblies,
(c) Proportion of assemblies with at least one defective component,
(d) Unit cost of the assembled product

Question 3

Determine the number of components at low and high level in the feed track, given the following data:

Cycle time = 0.3 min
Feed rate = 24 components / min
Time to empty feed track to low level= 3 min
Time to fill feed track to high level= 15 min

Question 4

An automated assembly machine has an ideal cycle time of 12 sec. Downtime is caused by defective parts jamming at the individual assembly stations. The average downtime per occurrence is 2.5 min. The fraction defect rate is 2%, and the probability that defective part will jam at a given station is 0.5 for all stations. The cost to operate the assembly machine is 400.0 SR/hr, and the cost of components being assembled is 2.5 SR/unit assemblies. Ignore other costs. **Determine:**

(a) Yield of good assemblies,
(b) Average production rate of good assemblies,
(c) Proportion of assemblies with at least one defective component,
(d) Unit cost of the assembled product.