MANUAL SIMULATION

Question 1

Consider the following problem, where parts arrive at a machine with following data;

Part#	Arrival	Service			
	Time	Time (hrs)			
1	0	2			
2	1	3			
3	2	5			
4	3	2			
5	5	1			

This problem was simulated on the machine up to time period; t = 15 hours.

The variables P and N were defined as under;

P = number of parts produced by time t.

N = number of parts that have passed by time t.

Now let's define variable S and S** as under;

S = number of parts in system (number of parts present in queue or in service area) at time t

 S^{**} = maximum number in system by time t so far.

Complete the following Table putting the values of P, N, S and S**

Time; t	Part#	Event	P	N	S	S*

Question 2

The machine in Question 1 experiences breakdown from time; t = 6. It is repaired and, machine starts working again at time; t = 9. During this time, Server is idle. Modify the following Table to accommodate machine breakdowns. Find; values of P, N, $\sum WT$,

WT* ,
$$\sum TS$$
 , TS* , $\int Q$, Q*, $\int B$. Show, (i) Waiting Time Graph, (ii) Process Graph

Time; t	Part#	Event	N	WQ	WQ*	\sum WQ	Q*	JQ	Р	TS	TS*	∑TS	ſВ
0	1	ARR											
2	2	ARR											
3	3	ARR											
4	1	DEP											
5	4	ARR											
6	**	Machine DOWN											
9	**	MACHINE WORKING AGAIN											
?	?	?											
?	?	?											
?	?	?											
?	?	?											
13*		End of SIMULATION											

Also find; Average waiting time (AWQ); Average Time-in-System (ATS)

Time-average Length of the Queue =
$$\frac{\int Q}{t}$$

Server Utilization =
$$\frac{\int B}{t}$$
Service Level =
$$\frac{Total_outX100}{Total_In}$$
Throughput Rate =
$$\frac{Total_out}{t}$$