

MECHANICAL ENGINEERING DEPARTMENT
Motilal Nehru National Institute of Technology Allahabad
END SEMESTER EXAMINATION (2016-17)
Subject: ME-1607: Production and Operation Management
B.Tech. VI Semester (Production and Industrial Engineering)

TIME: 3 Hour

MAX. MARKS: 60

Note: Attempt all questions. Assume any missing data and write clearly.

- Q.1 (a)** Distinguish between design capacity and system capacity. Explain different capacity expansion strategies with their advantages and disadvantages. [4]

- (b)** A company is setting up an assembly line to produce 192 units per eight-hour shift. The following table identifies the work elements, times and immediate predecessors. [6]

Work Element	Time (seconds)	Immediate Predecessor(s)
A	40	None
B	80	A
C	30	D, E, F
D	25	B
E	20	B
F	15	B
G	120	A
H	145	G
I	130	H
J	115	C, I

i) What is the desired cycle time?

ii) What is the theoretical minimum number of stations?

iii) Use the largest work-element time rule to work out a solution, and show your solution on a precedence diagram.

iv) What are the efficiency and balance delay of the solution found?

- Q.2 (a)** An electronic manufacturer must expand by building a second facility. The search has been narrowed to four locations. Assessment of these sites in terms of seven location factors is shown in Table below. [6]

Location factor	Factor weight	Factor Score for each location			
		A	B	C	D
Labor climate	20	5	4	4	5
Quality of life	16	2	3	4	1
Transportation system	16	3	4	3	2
Proximity to markets	14	5	3	4	4
Proximity to materials	12	2	3	3	4
Taxes	12	2	5	5	4
Utilities	10	5	4	3	3

Calculate the weighted score for each location. Which location should be recommended?

- (b)** Explain the difference between job design and job standards. What are the different parts of effective job design? [4]

- Q.3 (a)** Define supply chain management. State the objectives of supply chain. [4]

- (b)** Indicate the characteristics of forecasts that would be concerned by the supply chain managers. [6]

A pipeline company wanted to schedule a pipeline construction project that is divided into the 13 activities listed in Table 1. [10]

Table 1: Pipeline company project

Activity	Predecessors	Normal		Crash	
		Time (m)	Cost (\$)	Time (m)	Cost (\$)
A	None	2	250	1.5	300
B	A	4	620	3.0	750
C	B	4	380	2.5	500
D	A	4	220	3.0	280
E	C	5	900	4.0	1150
F	E	6	750	4.5	975
G	E	3	180	3.0	180
H	F	3	340	2.0	450
I	D,F	3	200	2.5	300
J	F,G	5	700	3.5	950
K	H	2	75	1.5	125
L	J	3	160	2.5	240
M	I,K,L	1	60	1.0	60

- Construct a PERT/CPM chart for this project.
- Do a two-pass analysis to determine the earliest time the project will be completed using the normal activity times, and identify the critical path activities.
- Suppose company wanted to completed the project in two months less time than that found in part (b); which activities should it crash and by how much?

Q.5 (a) Consider the following production line in which tasks A through H must be performed. [6]

Station	1	1	2	3	3	4	5	6
Task	A	B	C	D	E	F	G	H
Task Time (hr)	2	1.5	4	2	2	3	2.5	3

- Identify the bottleneck operation.
- What is the minimum cycle time?
- Assuming an eight hour work day, what is the maximum daily output?
- If the line uses one employee per station, how many hours of ideal time are there daily?
How many hours of productive time?
- Calculate the efficiency of the line.

- Explain EOQ model. What are the different assumptions of EOQ model. [2]
- Explain briefly the factors affecting the facility location. [2]

Q.6 Explain in brief [10]

- Wastes in production system
- JIT Manufacturing
- MPS
- Product reliability
- The Malcolm Baldrige Quality Award