

MEL754: Operations Planning & Control

State all your assumptions very clearly. Your response should be pointed. Please give examples from real world to strengthen your points. This will carry weightage. Maximum Marks:70 (**Weightage: 35 %**)

Section A [Marks: S1 to S3 4 x 3=12, S4 to S8, 6 x 5=30 , Total 42]

Some situations are given below. The decision taken/committed is also given. With as much quantification as possible, justify whether the decision is correct or not.

Note: There is **NO PARTIAL** credit for your solution.

- S1: **Situation:** Titex Ltd(TL) must select a process for its new product, OMX from among the three different alternatives processes A, B and C:

Cost	Process A	Process B	Process C
Fixed cost (In Mu)	10000	40000	70000
Variable cost per unit (in Mu)	5	2	1

Decision: For Volumes between 10,000 and 13,000 units of OMX, process A must be selected.

- S2: **Situation:** Consider the following payoff table (values in '000 Mus) for 3 alternatives and various market scenarios:

Alternative	Market scenario		
	S1	S2	S3
A	1.0	2	0.5
B	0.8	1.2	0.9
C	0.7	0.9	1.7

Decision: According to Hurwicz's criterion (with optimism index as 0.6), the company must choose Alternative B

- S3: **Situation:** RFS Ltd needs to produce 6000 units of a product, ATN every 40-hour week. The work elements involved in this product are as follows:

Work element	Precedence	Time (Minutes)
A	-	0.1
B	A	0.2
C	A	0.4
D	B,C	0.3

Decision: The maximum line efficiency of a balanced assembly line is 80 %.

- S4: **Situation:** The Pizzahut (PH) purchases food ingredients from 4 suppliers (A to D). PH wants to locate a new central distribution centre to process and package the ingredients before shipping them to final customers. The location of these suppliers and the annual number of truck load is given below:

Location (i)	A	B	C	D
x-coordinate(X_i)	200	100	250	500
y-coordinate (Y_i)	200	500	600	300
Annual Load (W_i)	75	105	135	60

Decision: New facility should be located at location E with coordinates (250, 500).

- S5: **Situation:** Piyush has selected a typical end-product, ABZ for which MRP software is to be used. The beginning inventory is 30 units, lead time is 1 week, ordering cost is Mu 60 per order; carrying cost is Mu 1 per unit per week.

Period	1	2	3	4	5
Gross Requirements	30	50	20	10	40

Decision: Piyush feels that among the Lot-for-Lot, EOQ and POQ (Periodic Order Quantity) rules, the POQ rule seems to be the best as it minimizes the total cost.

- S6: **Situation:** Apex Ltd (AL) has 5 jobs to be scheduled on a machine.

Job	A	B	C	D	E
Processing time (days)	5	10	2	8	6
Due date (days)	10	15	5	12	8

Decision: Animesh feels that among the rules First-Come-First-Served (FCFS), Earliest-Due-Date (EDD), and Shortest-Processing-Time (SPT), the jobs need to be sequenced according to SPT since it minimizes the number of tardy jobs.

- S7: **Situation:** Consider the following data for Apex Ltd for its press-line during week number 42 in 2006. Total available time during the period (in hours): **76**; Total downtime including scheduled and unscheduled maintenance, set-up times, lack of personnel, etc. (in hours): **18**; Theoretical maximum output (in units per hour):**200**; Actual Production (in units) during the period : **8200**; Output (in units) that had to be re-worked or scrapped: **35**

Decision: The OEE (Overall Equipment Effectiveness) of the press line is only 54 %.

- S8: **Situation:** Currently, FairDeal Ltd (FDL), a retail outlet has six departments (A to F) organized as given below. The number of customers that move between the departments each week is given below.

A	B	C
D	E	F

Existing Layout (each cell 10 m x15 m)

A	B	C
F	E	D

Modified Layout(each cell 10 m x 15 m)

From/To	A	B	C	D	E	F
A	—	70				50
B		—			100	
C		70	—			
D			80	—		
E	40				—	30
F		60			100	—

Decision: By interchanging the position of departments D and F as shown in the modified layout, the nonadjacent load is reduced by 50 %.

Section B[Marks : 28]

WVC Industrial Chemicals Company is a large producer of several industrial chemicals widely used in the manufacture of steel, glass, and rubber and in various types of food processing operations. The WVC operation is a continuous, 24-hour-a-day processing operation in which the ingredients for a finished chemical undergoes a series of a dozen or more purifying, mixing, and concentrating operations. After each operation is completed, the chemical is put in liquid form and pumped to the next processing operation, in some cases at high temperatures and in others at low temperatures. In total, the plant has over 400 pumps and 50 major processing machines in operation. WVC's supply department is organized into four sections: (1) operating materials, (2) capital equipment, (3) maintenance parts for capital equipment, and (4) MRO supplies.

WVC has developed an extensive and carefully planned two-phase preventive maintenance program. In the first phase, each pump and each major piece of equipment is taken out of service for a short period of time each month and given preplanned, routine maintenance, such as replacement of bearings, seals, and other parts subject to predictable wear. The second phase involved a production shutdown and complete overhaul of each piece of equipment every eighteen months. Bills of material and engineering drawings for all machines are on file, and a list of specific parts required for the overhaul of each machine is available approximately four months before the work is to be done.

For the upcoming phase-two shutdown, maintenance manager Jitesh was handling the requirement for three large cast pump housings. The large housings were first cast using special alloy steel, and then machined to very close tolerances to meet WVC's precise operating requirements. Because of the high cost involved, Jitesh solicited bids from four foundries to which all of the foundries responded. Though their quoted prices and lead times varied considerably. Because of the tight timing requirements, Jitesh decided to go with Western Foundry, which quoted a twelve-week delivery, even though Western's price was approximately 10 percent higher than the low bidder. Jitesh had done business with Western before and knew that it was a reliable, high quality firm. In addition, the Western sales representative assured Jitesh that his firm could easily meet twelve-week delivery requirement.

Four weeks before the scheduled delivery for the castings, Jitesh received a call from the inside sales department at Western. The young man on the other end of the line told that two of the three castings had to be scrapped because of problems that developed during the machining operations. This unexpected turn of events left Jitesh speechless—he did not know what to say next.

- B.1. With reference to WVC, explain the role of operations strategy. [Marks: 3]
- B.2. If you had been Jitesh, how would you have handled the follow-up function? [Marks: 7]
- B.3. How do you think, the framework based on theory of constraint (TOC) would help Jitesh. [Marks: 6]
- B.4. State briefly how ERP based system would help Jitesh. [Marks: 5]
- B.5 Explain, how the concept of APP can be implemented in WVC. [Marks: 7]