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Question No: 01

a) Define General Process Chart and how it characterizes the process?

ANSWER

GENERAL PROCESS

A flowchart is a picture of the separate steps of a process in sequential order. It is a generic tool that can be adapted for a wide variety of purposes, and can be used to describe various processes, such as a manufacturing process, an administrative or service process, or a project plan.

CHARACTERIZED THE PROCESS

- The number of activities per category
- The amount of time spent in each activity category
- The percentage of the total processing time spent on each category.

b) List disadvantages of Process Activity Chart.

ANSWER

- Only considers average activity times
- Cannot depict parallel activities.
- If the process includes several variants with different paths (i.e. multiple paths through the process) each variant needs its own activity chart.

c) Compute Load Distance (LD) scores for the below given current and proposed designs and identify which design is the better one;

ANSWER

The LD score between work centers i and j is found as follows:

$$\text{LDscore}(i, j) = \text{Load}(i, j) \times \text{Distance}(i, j)$$

LD Calculation for Two Designs

Centers	Load	Current Design		Proposed Design	
		Distance	LD Score	Distance	LD Score
(A,B)	20	2	40	1	20
(A,D)	20	1	20	1	20
(A,F)	80	3	240	3	240
(B,C)	10	2	20	1	10
(B,E)	75	3	225	1	75
(C,D)	15	1	15	3	45
(C,F)	90	1	90	1	90
(D,E)	70	2	140	1	70
Total			790		570

Question No: 02

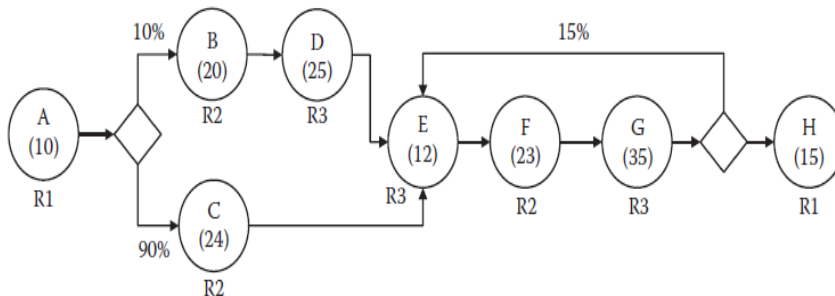
- a. The observation periods for 3, 6, 5, and 2 jobs are 10, 20, 20, and 10 min, respectively. In other words, the WIP was 3 jobs for 10 min, 6 jobs for 20 min, 5 jobs for 20 min, and 2 jobs for 10 min. Then, calculate the average WIP?

ANSWER

$$\text{Average WIP} = \frac{3 \times 10 + 6 \times 20 + 5 \times 20 + 2 \times 10}{10 + 20 + 20 + 10} = 4.5 \text{ jobs}$$

- b. A process management team has studied a process and has developed the flowchart in Figure 3. The team also has determined that the expected waiting and processing times (in minutes) corresponding to each activity in the process are as shown in Table 1.
- Calculate the average CT for this process.
 - Calculate the CT efficiency.

Activity	Waiting Time (Min)	Processing Time (Min)
A	20	12
B	15	18
C	5	30
D	12	17
E	3	12
F	5	25
G	8	7
H	5	10
I	15	25
J	5	20
K	4	10



ANSWER

- Average CT:** $10 + 10 \times 20 + 90 \times 24 + 25 + 15 \times (12 + 23 + 35) + 15 = 34.60$

iii. Calculate the CT efficiency.

- CT efficiency = Process Time / CT**

$$\text{Process time} = 12 + 10 \times 18 + 90 \times 30 + 17 + 1.15 \times (12 + 25 + 7) + 10 = 29.69$$

- CT efficiency** = $34.60 / 29.69 = 1.17$

Question No: 03

Analyse capacity needs and utilization with the help of below given data and fill the given table using respective formulas;

Activity	Processing Time (Min)	Resource Requirements	Number of Jobs
A	2	R1	1
B	5	R1	0.3
C	8	R2	1
D	3	R2	1.1
E	4	R2	1.1
Inspection	4	—	1.1
F	2	R1	1
G	4	R3	1
H	2	R3	1

ANSWER

Resource	Unit Load(Min)	Unit Capacity Jobs/min	Available Resources	Pool Capacity Jobs/min
R1	$2+5 \times 0.3+2=5.5$	$1/5.5$	2	$2/5.5=0.36$
R2	$8+1.1 \times (3+4)=15.7$	$1/15.7$	2	$2/15.7=0.13$
R3	$4+2=6$	$1/6$	1	$1/6=0.17$

Question No 04:

List the steps for TOC Methodology.

ANSWER**TOC Methodology**

- 1. Identify the system's constraints**
- 2. Determine how to exploit the constraints**
 - Choose decision/ranking rules for processing jobs in bottleneck
- 3. Subordinate everything to the decisions in step 2**
- 4. Elevate the constraints to improve performance**
 - For example, increasing bottleneck capacity through investments in new equipment or labor
- 5. If the current constraints are eliminated return to step 1**
 - Don't lose inertia, continuous improvement is necessary!