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| Subject | Business Process Engineering |
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IQRA NATIONAL UNIVERSITY

SPRING 2020 Final-Term Examination

| Course Name | Course Code | Max. Marks | Max. Time | Date | Instructor |
|------------------------------|-------------|------------|-------------------|--------------------------------|------------|
| Business Process Engineering | SEE-306 | 50 | 6 Hours 9-3 PM | 23 rd June, 2020 | Aasma Khan |

- **Attempt all questions.**
- **Marks will be given as per the DEPTH of the answer, not LENGTH.**

Question No: 01

(4+3+8)

- Define General Process Chart and how it characterizes the process?

General Process Chart:

The charting of work flows, working processes, systems and procedures is a useful way of recording the essential features of a work situation for subsequent analysis. Process Charts are one of the simpler forms of workflow charting and are still in regular usage.

Summarizes the current process the redesigned process and the expected improvements

Characterizes the process by

- 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

Clearly indicates

- Major problems with the existing process
- How the redesigned process remedies these problems
- These problems measured are in terms of the time and the percentage of time spent on value and non-value adding activities

b) List disadvantages of Process Activity Chart.

Disadvantages:

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

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

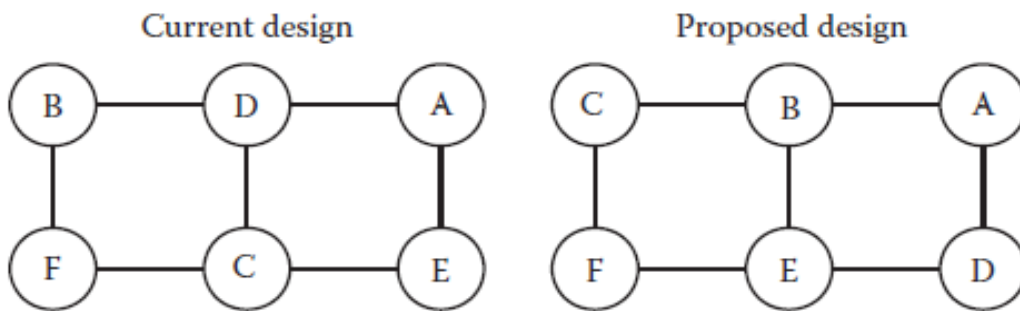


Figure 1 Two Designs

| | A | B | C | D | E | F |
|---|---|----|----|----|----|----|
| A | | 20 | | 20 | | 80 |
| B | | | 10 | | 75 | |
| C | | | | 15 | | 90 |
| D | | | | | 70 | |

Figure 2 Load Matrix

Load Distance Formula:

In process flow diagram for calculating load distance the formula is

- $LD\text{-Score}(i,j) = \text{Load}(i,j) \times \text{Distance}(i,j)$

LOAD DISTANCE CALCULATION FOR TWO DESIGNS

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

The Proposed Design is the better one because its total load distance is **570** which is which is minimum and better then the higher one which is **790**.

cfzs

Question No: 02

(5+10)

- 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?
- 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.
 - i. Calculate the average CT for this process.
 - ii. 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 |

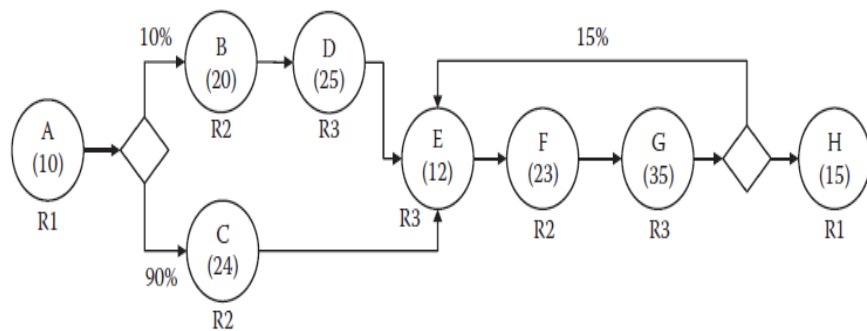


Figure 3 Process Flow Chart

- Calculate the average CT for this process

Ques no 2 (Part-A)

$$\text{Average WIP} = 3 \times 10 + 6 \times 20 + 5 \times 20 + 2 \times 10 \quad | \quad 10 + 20 + 20 + 10 =$$

4.5 jobs

Ques no 2 (Part-B)

Cycle Time Calculation:

$$\color{red}{\oplus} \text{ Average CT: } 10 + 0.1 \times 20 + 0.9 \times 24 + 25 + 1.15 \times (12 + 23 + 35) + 15 = \mathbf{154.1}$$

- Calculate the CT efficiency.

$$\color{red}{\oplus} \text{ CT efficiency} = \text{Process Time} / \text{CT}$$

$$\text{Process time} = 12 + 0.1 \times 18 + 0.9 \times 30 + 17 + 1.15 \times (12 + 25 + 7) + 10 = \mathbf{126.2}$$

CT efficiency = $126.2/154.1 = 0.819$

Question No: 03

(10)

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:

(10)

List the steps for TOC Methodology.

- **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 loose inertia, continuous improvement is necessary!**

Good Luck ☺