# IQRA NATIONAL UNIVERSITY

SUMMERS 2020 Final-Term Examination

| Course Name | Course Code | Max. Marks | Max. Time | Date | Instructor |
|---|---|---|---|---|---|
| Business Process Engineering | SEE-306 | 50 | 4 Hours<br>9-1 PM | 29th Sep, 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)

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

**Answer no 01:**

**Part (a)**

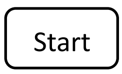
A flowchart is a type of diagram that represents a workflow or process. A flowchart can also be defined as a diagrammatic representation of an algorithm, a step-by-step approach to solving a task.

The flowchart shows the steps as boxes of various kinds, and their order by connecting the boxes with arrows. This diagrammatic representation illustrates a solution model to a given problem. Flowcharts are used in analysing, designing, documenting or managing a process or program in various fields.

The simplest form of process chart is known as an outline process chart and records an overview or outline of a process. Only those steps of a process that can be represented by the ASME symbols of operation and inspection are recorded.

**Characterizes the process:**

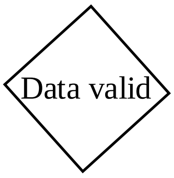
A terminal has in oval shape and indicates the binging and end of the program flow in your diagram.



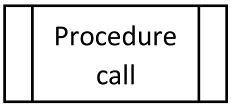

A parallelogram-shaped data denotes either the input or output of information in your flowchart diagram.


A process is represented as rectangular and denotes any process or action step to be carried out

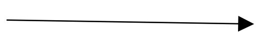

A decision is represented as a diamond shape and indicate decision point between two or more path in your flow chart diagram.




A predefine process is represented as a double line rectangular and indicates a marker for another process step or series of process flow step that are formally defines elsewhere this shape also commonly depicts sub processes.




Dynamic connecter show the direction that the process flows and represents line connecter that automatically routes between the shape its connects, using a right-angled line.



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b) List disadvantages of Process Activity Chart.

**Part (b)**

### Disadvantages of process activity chart:

UML modelling language understands that these sketches can be very complex due to their ease of use, and allows them to be described in detail. In other words, since project information is so easy to see, why isn't everything included? When an analyst has a large project, it can be tempting to create a single, overly complex chart.

The only drawback is the UML Activity Diagram is the messages or the communications between two components or the user cannot be shown.

When using an action diagram to describe the structure of a workflow, you shouldn't really try to go through too many sets of exercise diagrams unless they may not be the most nuclear set. Instead, the analyst should try to update a new set of functions for each individual, or if applicable, use the third lanes of existing individual actors to complete the same job.

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

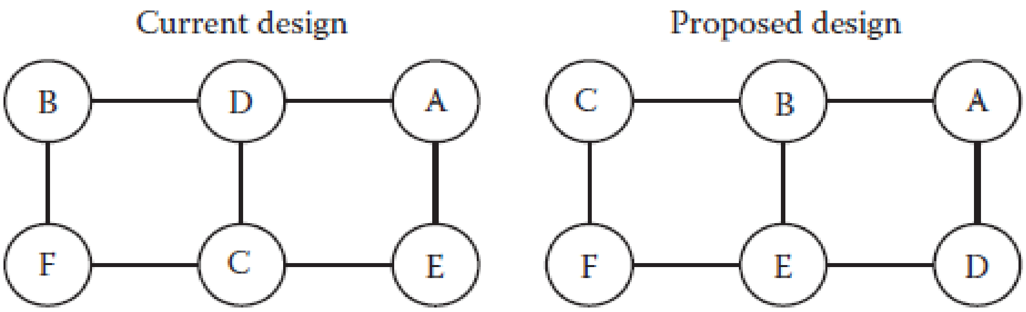


Figure 1 Two Designs

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

Figure 2 Load Matrix

**Part (c)**

**As we know that:**

LD(i,j)=Load(i,j)*Distance(i,j)

| | | Current | Design | Proposed | Design |
|---|---|---|---|---|---|
| **Centres** | **Load** | **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,D) | 90 | 1 | 90 | 1 | 90 |
| (D,E) | 70 | 2 | 140 | 1 | 70 |
| | | **Total** | **790** | **Total** | **570** |

The proposed design is better than the current design.

**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?

**Answer no 02:**

**Part (a)**

**The average WIP calculated as follows:**

$$\text{Average WIP} = \frac{3x10+6x20+5x20+2x10}{10+20+20+10} = 4.5 \text{ jobs}$$

We will used WIP to denote the average or expected number of jobs in the process.

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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 |

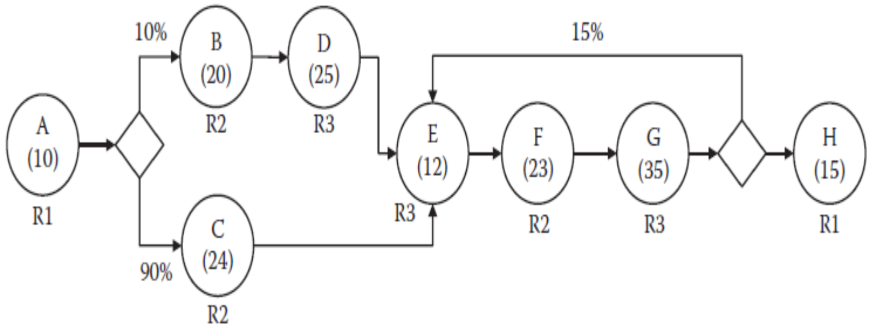


Figure 3 Process Flow Chart

**Part (b)**

### (a) Calculate the average cycle time efficiency.

$CT = T_A + (1+0.2)(T_B + T_C) + T_D + \max\{T_E, T_G, T_F\} + 0.9(T_H) + T_I$

The activity time = Processing time+ Waiting time

CT = 10+1.2(13+6)+15+max{9,3,7}+0.9(17)+10

= 82.1 minutes

### (b) Calculate the cycle time efficiency

The theoretical cycle time (CT*)is obtained by using the processing time instead of the activity times.

CT* = 3+1.2(8+2)+5+max{2,3,5}+0.9(9)+8

= 41.1 minutes

The cycle time efficiency = $\frac{41.1}{81.1}$ = 50.1%

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**Question No: 03** (10)

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

### Answer no 03:

### Fill the bellow table:

| 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 |

| Resource | Unit Load(Min) | Unit Capacity Jobs/min | Available Resources | Pool Capacity Jobs/min |
|---|---|---|---|---|
| R1 | 09 | 2.3 | 2 | 20.7 |
| R2 | 15 | 3.2 | 2 | 48 |
| R3 | 06 | 2 | 1 | 12 |

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**Question No 04:** (10)

List the steps for TOC Methodology.

**Answer no 04:**

**Step for TOC Methodology:**

Step 1: Identify the constraint

This tells us where to focus our improvement efforts, since we know that only an improvement at the constraint makes a difference.

Step 2: Optimize the constraint

Before adding capacity, we need to use the capacity we already have. “Optimize” in this sense means “doing everything possible to use the constraint to its fullest capacity.”

Step 3: Subordinate the non-constraints

The job of all non-constraints is to subordinate their decisions to the constraint’s needs. They should optimize for constraint (and thus system) performance, not their own individual performance.

Step 4: Elevate the constraint

Only once we’ve completed the previous steps does it make sense to add more constraint capacity, and thereby increase system performance. Because adding capacity is tremendously expensive in terms of time and money, we do it as a last resort, not a first resort.

### Step 5: Return to step 1

The inevitable result of the first four steps, and the reason this is a “continuous” improvement method, is that the constraint moves somewhere else. This step insists that you start back at the beginning, and don’t let inertia become the constraint.

Good Luck ☺