**SIMULATION AND MODELING**

**PROJECT PROPOSAL**

**Section: BSE-6A**

**Group Members:**

**21k-3881 (Taha Jawaid)**

**Problem Statement:**

**4-15** Items arrive from an inventory-picking system according to an exponential interarrival distribution with mean 1.1 (all times are in minutes), with the first arrival at time 0. Upon arrival, the items are packed by one of four identical packers, with a single queue “feeding” all four packers. The packing time is TRIA(2.75, 3.3, 4.0). Packed boxes are then separated by type (each box has an independent probability of 0.2 of being international, and the rest are domestic), and sent to shipping. There is a single shipper for international packages and two shippers for domestic packages with a single queue feeding the two domestic shippers. The international shipping time is TRIA(2.2, 3.3, 4.8), and the domestic shipping time is TRIA(1.7, 2.0, 2.7). This packing system works three 8-hour shifts, 5 days a week. All the packers and shippers are given a 15-minute break 2 hours into their shift, a 30-minute lunch break 4 hours into their shift, and a second 15-minute break 6 hours into their shift; use the Wait Schedule Rule. Run the simulation for a single replication of 2 weeks (10 working days) to determine the average and maximum number of items or boxes in each of the three queues (put a text box in your model reporting these output values). Animate your model, including a Resource

**Deliverables:**

**Model Diagram:** A detailed graphical representation of the system model created within Arena Software. This diagram illustrates the entities, processes, and interactions defined in the model.

**Simulation Results:** Data and analysis obtained from running the simulation model multiple times.

**Final Report:** A comprehensive report (in pdf format) summarizing the modeling process, simulation results, analysis, and recommendations. The report typically includes an introduction to the problem, description of the model and simulation methodology, presentation of results and findings, discussion of insights and implications.

**Group Distribution of Work:**

**1st Member:**

* This member's role is to thoroughly understand the problem at hand and identify all the relevant entities involved.
* Entity can be anything that plays a role in the system being studied, such as people, machines, resources, or processes.
* Once all entities are identified, the member creates a rough flowchart that visually represents the sequence of events or processes involved in the problem. This flowchart serves as a preliminary outline of how the system operates.

**2nd Member:**

* Using the rough flowchart provided by the first member, the second member utilizes Arena Software, a popular simulation software used for modeling and analyzing complex systems.
* The member translates the flowchart into a detailed model within Arena Software. This involves defining entities, their attributes, relationships, and interactions.
* Arena Software provides a graphical interface for constructing models using blocks representing entities and processes, along with connecting arrows indicating the flow of entities through the system.
* Attributes such as processing times, arrival rates, capacities, and other parameters are assigned to entities and processes based on the problem scenario provided.

**3rd Member:**

* After the model is constructed in Arena Software, the third member applies simulation techniques to the model.
* Simulation involves running multiple iterations of the model to simulate the behavior of the system over time. This helps in understanding how the system behaves under different conditions and scenarios.
* Once simulation runs are completed, the member generates a final report summarizing the findings. This report typically includes key performance indicators, analysis of system behavior, and insights derived from the simulation results.
* The report is usually formatted into a PDF document for easy sharing and presentation to stakeholders or decision-makers.