INTCOM QUIZ

GROUP 1 (COMPUTER SIMULATION)

COMMPUTER SIMULATION – a digital model that uses mathematical equations to imitate real-world scenarios or system.

PURPOSE = Understanding Complex Systems, Experimentation Without Risk, Cost and Time Efficiency, Predictive Analysis, Training and Education, Innovation and Development.

EXAMPLE APPLICATIONS = HEALTHCARE SIMULATIONS, FLIGHT SIMULATORS, DRIVING SIMULATORS, SAFETY TESTING/CAR CRASH SIMULATIONS, ENVIRONMENTAL STUDIES, WEATHER FORECAST SIMULATORS, ENGINEERING AND DESIGN, TRAINING AND EDUCATION.

All in all, Computer Simulation is a versatile tool that enhances understanding enables safe experimentation, improves efficiency, supports predictive analysis, aids training, and fosters innovation across numerous disciplines. Its ability to replicate complex systems digitally makes it an invaluable resource in both research and industry contexts.

GROUP 2 (TYPES AND APPLICATION OF COMPUTER SIMULATION)

WEATHER FORECASTING SIMULATIONS – Weather forecasting uses computer simulations to predict future weather by analyzing current and past data. These simulations rely on mathematical equations that represent how the atmosphere works, including temperature, wind, and energy changes.

KEY FEATURES: High-Resolution Models, Data Assimilation, Ensemble Forecasting, Real-Time Processing, Visualization Tools, User Interface.

VIRTUAL TRAINING SIMULATION (VTS) – refers to the use of computer-generated environments and scenarios to replicate real-world processes for training purposes. These simulations provide immersive and interactive experiences, enabling users to learn and practice skills in controlled settings.

KEY FEATURES: IMMERSIVE ENVIROMENTS, INTERACTIVITY, FEEDBACK MECHANISMS.

APPLICATIONS OF VIRTUAL TRAINING SIMULATION: MILITARY TRAINING, HEALTHCARE, CORPORATE TRAINING, AVIATION, EMERGENCY RESPONSE

BENEFITS OF VIRTUAL TRAINING SIMULATION: COST-EFFECTIVE, SAFE LEARNING ENVIRONMENT, ENHANCE ENGAGEMENT, FLEXIBILITY.

GAME AND ENTERTAINMENT SIMULATIONS – are a genre of virtual games designed to replicate real-world experiences or fantastical scenarios in an interactive format. These simulations often focus on creating an immersive, engaging environment that mimics reality or provides players with an alternative form of entertainment through digital interaction. Some common examples include life simulators, sports games, and even theme park management simulations.

KEY FEATURES: Realism and Accuracy, Interactive Gameplay, Progression and Development, Customization and Personalization, AI and Non-Player Characters (NPCs).

REAL-WORLD APPLICATION OF COMPUTER SIMULATION – It is the process of using a computer program to model and replicate the behavior of a real-world or hypothetical system over time. It involves creating a digital representation of a system, process, or phenomenon, and then using computational methods to analyze and predict its behavior under various conditions.

BENEFITS: SAVING MONEY AND TIME, STAYING SAFE, MAKING BETTER DECISIONS, LEARNING MORE, PRACTICING AND GETTING BETTER, BEING FLEXIBLE

GROUP 3 (HOW COMPUTER SIMULATION WORKS?)

– Step involved in setting up and running a computer simulation involves several key steps, from developing the model to executing the simulation and analyzing the result.

***The Basic Steps of a Simulation Study***

The application of simulation involves specific steps in order for the simulation study to be successful. Regardless of the type of problem and the objective of the study, the process by which the simulation is performed remains constant. The following briefly describes the basic steps in the simulation process.

***Problem Definition***

The initial step involves defining the goals of the study and determing what needs to be solved. The problem is further defined through objective observations of the process to be studied. Care should be taken to determine if simulation is the appropriate tool for the problem under investigation.

***Project Planning***

The tasks for completing the project are broken down into work packages with a responsible party assigned to each package. Milestones are indicated for tracking progress. This schedule is necessary to determine if sufficient time and resources are available for completion.

***System Definition***

This step involves identifying the system components to be modeled and the pre-formance measures to be analyzed. Often the system is very complex, thus defining the system requires an experienced simulator who can find the appropriate level of detail and flexibility.  
**Model Formulation**

Understanding how the actual system behaves and determining the basic requirements of the model are necessary in developing the right model. Creating a flow chart of how the system operates facilitates the understanding of what variables are involved and how these variables interact.

***Input Data Collection & Analysis***

After formulating the model, the type of data to collect is determined. New data is collected and/or existing data is gathered. Data is fitted to theoretical distributions. For example, the arrival rate of a specific part to the manufacturing plant may follow a normal distribution curve.

***Program Implementation***

The model is translated into programming language. Choices range from general purpose languages such as fortran or simulation programs such as Arena.

***Program Implementation:***

- Select Simulation Software: Choose a programming language or simulation software based on the complexity of your  model and your specific requirements. Popular option include:

**General-purpose programming language**: Python , C++, MATLAB  
**Specialized Software**: Simulink, Ansys, COMSOL for engineering, or any logic for agent-based simulations.  
**Coding the Model**: Implement the mathematical equations and relationships in code.

***Verification & Validation***

Verification is the process of ensuring that the model behaves as intended, usually by debugging or through animation. Verification is necessary but not sufficient for validation, that is a model may be verified but not valid. Validation ensures that no significant difference exists between the model and the real system and that the model reflects reality. Validation can be achieved through statistical analysis. Additionally, face validity may be obtained by having the model reviewed and supported by an expert.

***Experimentation & Analysis***

Experimentation involves developing the alternative model(s), executing the simulation runs, and statistically comparing the alternative(s) system performance with that of the real system.

***Documentation & Implementation***

Documentation consists of the written report and/or presentation. The results and implications of the study are discussed. The best course of action is identified, recommended, and justified.

GROUP 4 (SIMULATION & MODELING)

Weather Forecasting Simulations – use mathematical models to predict atmospheric conditions by solving complex equations based on current weather data.

Applications: Real-time forecasts, climate change modeling, disaster preparedness (e.g., predicting hurricanes or floods).

Virtual Training Simulations **–** replicate real-world environments to train individuals

without the risks or costs associated with physical training.

Applications: Military and Aviation: Pilots and soldiers use flight or combat simulators to practice without endangering lives.

Game Simulations **–** in gaming often mimic real-life scenarios or create immersive environments, allowing users to interact in virtual worlds.

Applications: Sports Games: Simulate real-world sports like football or basketball with realistic physics.

Engineering and Design Simulations **–** Engineers use simulations to test designs under various conditions before physical prototypes are made.

Applications: Automotive: Crash simulations to test vehicle safety. Architecture: Simulations that predict how a building will handle stress from wind, earthquakes, or other factors.

Healthcare Simulations **–** use virtual patients or disease models to understand biological processes or train medical professionals.

Applications: Simulating disease spread (e.g., COVID-19 models), personalized medicine, or pharmaceutical development.

Economic and Market Simulations **–** economists use simulations to model financial systems, markets, and economic behavior.

Applications: Stock market simulations, predicting the impact of policy changes, or analyzing consumer behavior.

Physics and Scientific Research Simulations **–** these simulations replicate physical processes to conduct experiments virtually.

Applications: Particle Physics: Simulating subatomic particle behavior (e.g., in particle accelerators like CERN).

Astrophysics: Simulating star formation, black holes, or the behavior of galaxies.

Computer simulations work by creating a mathematical or logical model of a real-world system and then running experiments on this model to analyze its behavior.

Modeling the System, Choosing the Simulation, Type Input Data, Simulation Execution, Optimization and Experimentation, Refinement and Iteration, Visualizing and Analyzing Results

ADVANTAGES OF COMPUTER SIMULATION

* Time saving
* Cost reduction
* Safe testing
* Flexibility and customization
* Repeatability

DISADVANTAGES OF COMPUTER SIMULATION

* Model Accuracy
* Computational limitations
* Reliance on assumptions
* Development cost and time
* Lack of real-world

GROUP 5 & 6 (ELECTRONIC PAYMENT SYSTEM)

**eCommerce**, or electronic commerce, refers to the buying and selling of good and services over the internet. It involves a wide range of activities, including online retail (B2C), **business-to-business transactions (B2B)**, **consumer-to consumer (C2C)** sales, and **direct-to-consumer (D2C)** sales.

**eCommerce** has become a staple in the global economy, allowing businesses to reach customers worldwide, streamline operations, and provide consumers with convenient shopping experiences**. B2C (Business-to-Consumer):** Retail stores selling directly to consumers.

**B2B (Business-to-Business):** Companies selling to other businesses. **C2C (Consumer-to-Consumer)**: Platforms for individuals to sell items to each other (e.g., marketplaces). **D2C (Direct-to-Consumer):** Brands selling directly to consumers, often bypassing traditional retailers.

**Why is eCommerce Important?**

**Global Reach:** Businesses can reach customers beyond geographical limits, broadening their customer base.

**Convenience:** eCommerce provides 24/7 shopping, letting customers make purchases whenever and wherever they like.

**Cost Savings:** Without the need for physical stores, businesses save on overhead costs and can often offer more competitive pricing.

**Data Insights:** Online transactions generate data that businesses can analyze to understand consumer behavior, enabling

personalized experiences and informed decision-making.

**Innovation:** eCommerce drives technological innovation, from AI-driven recommendations to real-time inventory management, improving business efficiency.

**Key Elements of eCommerce**

**Online Storefront:** This is the website or app where customers browse products, add items to their cart, and make purchases.

**Product Catalog and Content:** A detailed catalog with descriptions, images, prices, and availability to help consumers make informed decisions.

**Shopping Cart and Checkout Process:** The digital equivalent of a shopping cart, where customers review and finalize their orders.

**Payment Gateway:** A secure system that processes online payments, accepting methods like credit cards, digital wallets, and bank transfers.

**Shipping and Fulfillment:** Includes inventory management, order fulfillment, and delivery tracking to ensure customers receive their products on time.

**ELECTRONIC PAYMENT SYSTEM**

An **electronic payment system**, often referred to as e-payment is a digital solution or infrastructure that enables customers to make payments and conduct electronic or online transfer of funds without the need for physical cash or cheques.

**Electronic payment systems** have revolutionized the way we handle our finances, making transactions quicker, more efficient, and accessible to anyone with a bank account. By eliminating the need for physical currency, e-payment systems have significantly reduced transaction costs, eliminated paperwork, and even reduced labour costs for businesses.

**ONE-TIME PAYMENT** is a single payment to an employee outside of their regular salary. For example, buying the latest iPhone via a one-time fee falls under the one-time purchase category, whereas paying for a monthly gym membership falls under the subscription category.

**RECURRING PAYMENT** in the simplest terms, recurring payments (also known as subscription payments, automatic payments, or recurring billing) take place when customers authorize a merchant to charge them repeatedly for goods or services on a prearranged schedule (monthly, weekly, daily or annually). Examples include cable bills, cell phone bills, gym membership fees, utility bills, and magazine subscriptions. Recurring billing may also be referred to as automatic bill payment.