Graduate Certificate in Engineering

Engineering Systems Analysis

Accuracy: The degree to which a measurement, calculation, or result is close to the true or accepted value. In Engineering Systems Analysis, accuracy is crucial to ensure reliable and valid outcomes.

Acronym: A word or name formed from the initial letters of other words, usually in capital letters and without spaces, such as GPS (Global Positioning System) or GDP (Gross Domestic Product).

Algorithm: A set of instructions or rules for solving a problem or performing a task in a finite number of steps, often used in Engineering Systems Analysis to optimize complex systems or processes.

Analysis: The process of examining a system, problem, or situation in detail to understand its components, relationships, and dynamics, often using quantitative or qualitative methods.

Analytical Hierarchy Process (AHP): A structured decision-making method for comparing complex alternatives based on pairwise comparisons and criteria weights, often used in Engineering Systems Analysis to evaluate multiple criteria or objectives.

Benchmarking: The process of comparing a system, process, or performance metric to a best practice, standard, or reference value, often used in Engineering Systems Analysis to identify improvement opportunities or assess progress.

Capital Expenditure (CAPEX): The cost of acquiring, upgrading, or maintaining physical assets, such as buildings, equipment, or infrastructure, often included in Engineering Systems Analysis to evaluate the financial impact of system changes.

Conceptual Design: The initial phase of designing a system or process, focused on defining the overall architecture, principles, and functions, often involving trade-offs and iterations.

Cost-Benefit Analysis (CBA): A method for evaluating the financial impact of a decision or investment by comparing the costs and benefits, often used in Engineering Systems Analysis to assess the economic viability of a system or project.

Decision Tree: A graphical representation of a decision-making process, showing the possible outcomes, probabilities, and payoffs of each option, often used in Engineering Systems Analysis to model complex or uncertain situations.

Deterministic Model: A model that assumes a fixed or predetermined relationship between inputs and outputs, often used in Engineering Systems Analysis to simplify complex systems or processes.

Discount Rate: The interest rate used to calculate the present value of future cash flows or benefits, often used in Engineering Systems Analysis to evaluate the financial viability of a system or project.

Dynamic System: A system that changes or evolves over time, often involving feedback loops, nonlinear relationships, or delays, often analyzed in Engineering Systems Analysis using simulation or optimization techniques.

Engineering Economy: The branch of engineering that deals with the financial and economic aspects of engineering projects, including cost estimation, investment analysis, and risk assessment, often included in Engineering Systems Analysis to evaluate the financial feasibility of a system or solution.

Engineering Optimization: The process of finding the best possible solution to a problem or system, often using mathematical or computational methods, such as linear programming, genetic algorithms, or machine learning, often used in Engineering Systems Analysis to improve system performance or efficiency.

Environmental Impact Assessment (EIA): A process for evaluating the potential environmental consequences of a proposed project or activity, often using quantitative or qualitative methods, often included in Engineering Systems Analysis to ensure sustainability and regulatory compliance.

Ergonomics: The science of designing systems, products, or environments to fit the needs and capabilities of human users, often including anthropometric, cognitive, and physiological factors, often considered in Engineering Systems Analysis to improve user experience and safety.

Factor Analysis: A statistical method for identifying the underlying factors or dimensions that explain the variation in a set of variables, often used in Engineering Systems Analysis to reduce complexity or identify patterns.

Feasibility Study: An analysis of the practicality, cost, and benefits of a proposed project or solution, often including technical, financial, and regulatory considerations, often conducted in Engineering Systems Analysis to evaluate the potential success of a system or solution.

Fault Tree Analysis (FTA): A graphical method for analyzing the possible combinations of events or conditions that can lead to a failure or accident, often used in Engineering Systems Analysis to identify critical factors or vulnerabilities.

Forecasting: The process of predicting future trends or events based on historical data or models, often used in Engineering Systems Analysis to plan or optimize system performance.

Functional Design: The phase of designing a system or process, focused on defining the specific functions, interfaces, and behaviors of each component, often involving detailed specifications and testing.

Fuzzy Logic: A mathematical approach for modeling uncertainty or imprecision in a system, using continuous or gradual membership functions instead of binary or discrete values, often used in Engineering Systems Analysis to handle complex or ambiguous situations.

Goal Programming: A mathematical optimization method for finding the best solution that satisfies multiple objectives or constraints, often used in Engineering Systems Analysis to balance conflicting goals or priorities.

Heuristic: A rule of thumb or a simple method for solving a problem or making a decision, often used in Engineering Systems Analysis to approximate or estimate complex or uncertain factors.

Human Factors: The discipline that studies the interactions between humans and technology, often including ergonomics, usability, and user experience, often considered in Engineering Systems Analysis to improve system performance and safety.

Incremental Cost: The additional cost of adding or upgrading a feature, component, or service, often used in Engineering Systems Analysis to evaluate the cost-effectiveness of a system or solution.

Indicator: A quantitative or qualitative measure of a system's performance, behavior, or condition, often used in Engineering Systems Analysis to monitor or evaluate system status or trends.

Influence Diagram: A graphical representation of a decision-making problem, showing the variables, relationships, and uncertainties, often used in Engineering Systems Analysis to clarify or communicate complex or uncertain situations.

Input-Output Analysis: A method for modeling the interdependencies between different sectors or components of a system, often used in Engineering Systems Analysis to evaluate the impact of changes or shocks on the overall system.

Integrated Design: A design approach that considers the system as a whole, rather than its individual components, often involving cross-functional teams, iterative processes, and holistic thinking, often used in Engineering Systems Analysis to optimize system performance and efficiency.

Interdependency: The mutual or reciprocal relationship between two or more components or factors of a system, often analyzed in Engineering Systems Analysis to understand the dynamics or feedback loops.

Life-Cycle Analysis (LCA): A method for evaluating the environmental impact of a product, process, or system, from cradle to grave, often used in Engineering Systems Analysis to assess the sustainability or circularity of a system or solution.

Linear Programming (LP): A mathematical optimization method for finding the best solution that maximizes or minimizes a linear objective function subject to linear constraints, often used in Engineering Systems Analysis to optimize system performance or efficiency.

Markov Chain: A stochastic process that models the probability of transitioning between states, often used in Engineering Systems Analysis to analyze dynamic or uncertain systems.

Monte Carlo Simulation: A statistical method for modeling complex or uncertain systems, using random sampling and probability distributions, often used in Engineering Systems Analysis to analyze the variability or risk of a system or solution.

Multi-Attribute Utility Theory (MAUT): A decision-making method for comparing complex alternatives based on multiple criteria or attributes, often used in Engineering Systems Analysis to evaluate the trade-offs or conflicts between different objectives.

Multi-Criteria Decision Analysis (MCDA): A family of decision-making methods for comparing complex alternatives based on multiple criteria or objectives, often using mathematical or computational techniques, such as AHP, MAUT, or TOPSIS, often used in Engineering Systems Analysis to evaluate the best or optimal solution.

Network Analysis: A method for modeling and analyzing the structure and behavior of complex networks, such as social networks, transportation systems, or power grids, often used in Engineering Systems Analysis to understand the patterns or dynamics of a system.

Non-Deterministic Model: A model that allows for uncertainty, variability, or randomness in the relationship between inputs and outputs, often used in Engineering Systems Analysis to handle