Indian Institute of Technology Madras
Department of Management Studies

Coursework and Syllabus for Comprehensive Viva

ANUKESH VALASE | MS19D200
Operations

Exam date: 23rd March 2021

A. MS6031 – Data Analysis for Research

Instructor – R. K. Amit

Data- Categorical and Numerical data, measurement scales, describing categorical and numerical data, mean, mode and median, association between categorical variables, association between numerical variables

Probability- Law of large numbers, independent events, conditional probability, dependent and independent variable

Random Variables- Properties of random variable, expected value, variance and standard deviation, association between random variables, dependence between random variables

Probability Model- Bernoulli model, binomial model, poisson model, normal probability model, central limit theorem, skewness and kurtosis

Confidence Intervals- Confidence interval for mean and proportion, interpreting confidence intervals

Statistical Tests- Hypothesis testing, type 1 and type 2 error, α-value, p-value

B. MS7080 - Research Methods In Business And Management

Instructor – Dr. Saji K Mathew

Approach to research – What is research? Researcher Bias, Research paradigms in management research, Epistemology and ontology in management research, Positivism vs. interpretivism

Foundations of theory – Theory in management research, Law and Theory, hypotheses and propositions, theory building

Qualitative research – Qualitative research in management, different qualitative approaches, interpretivism and positivism in qualitative research

Quantitative research – Concepts, constructs and measurement, scales of measurement, survey-based research, experimental design

Research design – Inductive and deductive approach, experimental approach, sampling techniques

C. Supply Chain Management

Instructor – Dr. Arshinder Kaur & Dr. Usha Mohan

Primitives – Evolution, Decision phase of supply chain, Process view of supply chain, Push/Pull view of supply chain, Supply chain drivers, Supply chain strategy.

Managing uncertainty and Inventory management – Single period inventory model, Multi-period inventory model, Measuring lead time and demand uncertainty, Risk pooling, Postponement.

Role of transportation in Supply chains – Trade-offs in network design, Drivers of Transportation decisions, Decision on mode of transportation, Distribution network design.

Value of information in supply chain and coordination – Bull whip effect: Causes, Quantifying and Mitigation, Information technology in supply chain.

Supply chain contracts – Buyback, Revenue sharing and Quantity flexibility contracts.

D. MS6032 – Predictive and Prescriptive Data Analytics

Instructor: Dr. Nandan Sudarsanam

Introduction – Fitting distributions to Data, Introduction to supervised, unsupervised, semi-supervised learning

Regression – Fitting lines, statistical inference, evaluating model fit, potential problems and fixes, choosing variables in multiple regression.

Supervised Learning concepts – K-nearest neighbours approach, Bias-Variance Dichotomy, Regularization and Coefficient Shrinkage, Cross validation, Dimensionality reduction – Principal component analysis and regression.

Classification – Logistic regression, Linear discriminant analysis, Support vector machines, Classification and Regression Trees

Unsupervised Learning – Clustering: Types of clustering and clusters, K-means and hierarchical clustering, Cluster Evaluation.

E. MS5110 – Microeconomics

Instructor -Dr. R. K. Amit

Primitives – Opportunity and Sunk costs, Average vs Marginal, Supply, Demand, Inverse demand functions, Notion of Equilibrium, Elasticity.

Modelling Costs – Production function, Total cost, Efficient scale of production, Technology, Isoquants, Isocosts, Returns to Scale, Economies of Scale, Cost Minimization, Double marginalization.

Perfect Competition – What is perfect competition?, Equilibrium with perfectly competitive firms, Short run and Long run analysis.

Monopoly – Profit maximization by a monopolist, Lerner Index of Market power, Optimal price and quantity, Price discrimination – 1^{st}, 2^{nd} , 3^{rd} degree price discrimination, Deadweight loss.

Competition – Primitives of Game theory, Nash Equilibrium, Homogeneous products Oligopoly: Cournot, Bertrand and Stackelberg models.

Risk and Information – Hidden information: Adverse Selection and Moral hazard, Auctions – out-cry and sealed bid auctions, Revenue Equivalence Theorem.