SCHOOL OF DATA SCIENCE AND FORECASTING

SYLLABUS FOR Ph.D. ENTRANCE TEST 2021-22 Subject: DATA SCIENCE

PART-B

Part-B shall also consist of 50 objective type compulsory questions of 1 mark each based on the syllabus of the subject at Masters Level as follows:

1- FORECASTING METHODS:

An overview of forecasting methods. Basic steps in forecasting. Basic forecasting tools: time series and cross-sectional data, graphical and numerical summaries, forecasting accuracy, prediction intervals, transformations and adjustments. Time series decomposition: principles of decomposition, moving averages, classical decomposition, census bureau methods, forecasting and decomposition. Smoothing methods: averaging methods, exponential smoothing methods, comparison of methods, general aspects of smoothing methods. Qualitative forecasting methods.

2- STATISTICAL RESEARCH METHODS:

Measures of variation, Skewness, moments and kurtosis, Index numbers. Interpolation and Extrapolation. Sampling and test of significance: Procedure of testing a hypothesis. Sampling of attributes, sampling of variables (large and small samples). Association of Attributes, Chi-square test and goodness of fit. Analysis of variance, Design of experiments. Introduction Two-variable linear Regression model: Basics, Problem of Estimation, Classical linear Regression Model.

3: DECISION ANALYSIS:

Types of decision; structuring the decision problem: payoff tables, decision trees; decision making without probabilities: optimistic approach, conservative approach, minimax regret approach; decision making with probabilities-expected value of perfect information. Decision analysis with sample information: expected value of sample information, efficiency of sample information; computing branch probabilities; utility and decision making. Game Theory, Two Person Zero-sum Games, Graphical Solution of (2 x n) and (m x 2) games.

4- OPTIMIZATION:

Operations Research: History, Phases, Applications and Limitations. Introduction to Linear Programming, Formulation of LP models, Solution of LP models-Graphical Method, Simplex Method, M-Method, Two-phase method, Duality & Dual-simplex method. Transportation model, Assignment model, Goal programming, Integer programming. Networks Models: CPM, PERT. Simulation.

5: DATA ANALYSIS:

Machine learning and data mining algorithms. Review of probability and probability distributions, Bayes Rule. Big data; Prediction vs. description; exploratory data analysis; data visualization, data journalism, dashboards. Classification, ranking, logistic regression. Ethics, time series, advanced regression.