Major Elective – 1

(Group – 1)

Statistics and Optimization Techniques

Course Objectives:

1. To enhance the knowledge regarding statistics and its applications to transportation engineering.
2. To make students conversant with different optimization techniques and their applications in transportation engineering.

Course Contents:

1. Social Research Formulation: Design of research, scaling techniques, sampling techniques, design of questionnaire.
2. Statistics & Probability Base: Various probability distributions & their applications, parameter estimation, hypothesis testing, random variables, method of maximum likelihood, hypothesis testing to compare multiple population, statistical quality control.
3. Linear & Multi-linear Regression and Correlation Analysis: Estimation and analysis of simple regression models, correlation coefficients, analysis of correlation coefficients, hypothesis tests associated with regression and correlation coefficients, multiple regression models.
4. Optimisation techniques: Linear programming, Simplex method, transportation model, Assignment problems.
5. Queuing theory, Queuing Models, Markov decision processes; Applications to inventory management and Replacement processes.

Tutorials:

1. Problems based on random sampling.
2. Problems based on probability distribution, hypothesis testing.
3. Problems based on linear regression analysis.
4. Problems based on linear programming, graphical method.
5. Problems based on Simplex method, its varieties.
6. Transportation and Assignment problem solution.
7. Problems based on Queuing theory.
8. Computer applications for solving the above mentioned problems.

References:

1. Benjamin J. R., Cornell C. A., *Probability Statistics and Decision for Civil Engineers*, McGraw-Hill, 1970.
2. Irwin R. Miller, Freund J. E. and Richard Johnson, Probability and Statistics for Engineers, PHI, New Delhi, 1990.
3. Hines W. W., Montgomery D. C., et. al., *Probability and Statistics in Engineering and Management Science*, John Wiley and Sons, New York, 1990.
4. Rao S.S., *Engineering Optimisation - Theory & Practice*, New Age International Publishers, Revised Edition III, 2006.
5. Sharma J.K., *Operation Research: Theory & Applications*, MacMillan India Ltd., 2000.
6. Bhandarkar P.L., Wilkinson T.S., *Methodology & Techniques of Social Research,* Himalaya Publishing House, 1991.
7. Gujarati Damodar, *Basic Econometrics*, Sheldor Ross Publications