

List of Experiments for Management Science Lab (B. Tech. – Production Engineering)

1. Problem Formulation, and Solution & Sensitivity Analysis Using LINGO
2. Simulation Exercise Using ARENA
3. Construction of X-bar and R Chart
4. Learning Curve
5. Preparation of Assembly Chart and Product Structure
6. Stop Watch Time Study of a Drill Press Operation
7. Visual Acuity Test
8. Method Study: Assembly and Disassembly Operation
9. Pin Board Assembly

Aim for each experiment

1. Problem Formulation, and Solution & Sensitivity Analysis Using LINGO
To formulate the given problem and solve the problem, using LINGO Mathematical Modelling Language. Do the sensitivity analysis and interpret the results.
Reference:
 - i. Ravindran, Philips and Solberg, Operations research: Principles and Practice, Second edition, John Wiley & Sons
 - ii. LINDO Systems, Inc., Optimisation Modeling with LINGO, Sixth edition, April 2006
 - iii. <http://www.lindo.com>
2. Simulation Exercise Using ARENA
To develop an ARENA flow chart model of the given problem and run the model for given replications and interpret the results.
Reference:
 - i. Banks, J., Carson-II, J.S. and Nelson, B.L., Discrete-Event System Simulation, Second edition, Prentice Hall of India
 - ii. Kelton, W.D., Sadowski, R.P., and Sturrock, D.T., Simulation with ARENA, Third Edition, McGraw Hill Higher Education.
 - iii. <http://www.arenasimulation.com/programs/default.asp>
3. Construction of X-bar and R Chart
To construct control charts – X-bar and R for the given production process. (First decide about the important quality characteristics of the part you are inspecting. For the given part the quality characteristic can be thickness or diameter. Take around 30 samples. Use twenty-five samples for establishing control charts. If remaining samples are available, plot them in the established control charts.) Determine the standard deviation of the process and calculate the process capability. Comment on the process centring and the ability of the process to produce a part with the specification 10 ± 0.02 mm if thickness is the important quality characteristic and if diameter is the important quality characteristic, the specification is 25 ± 0.02 mm.
Reference:
 - i. Grant, E.L, and Leavenworth, R.S., Statistical quality Control, Seventh Edition, Tata McGraw-Hill
 - ii. Montgomery, D.C., Introduction to Statistical quality Control, Fourth Edition, John Wiley

- iii. Juran, J.M. and Gryna, F.M., Quality Planning and Analysis, Third Edition, Tata McGraw-Hill Edition
4. Learning Curve
To prepare learning curve for mirror drawing and coin sorting setups and determine the percentage of learning.
Reference:
 - i. Chase, R.B., Aquilano, N.J. and Jacobs, F.R. (1999) Production and Operations Management: Manufacturing and Services, Eighth Edition, Tata McGraw-Hill Edition – Chapter 11, Supplement – Learning Curve, pp 445 – 461.
5. Preparation of Assembly Chart and Product Structure
To prepare an assembly chart and product structure diagram for the given hand drill. Also prepare MRP records based on the manufacturing environment specified and develop a dispatch list for the items.
Reference:
For product structure details and MRP refer –
 - i. Vollmann, Berry, Whybark and Jacobs, Manufacturing Planning and Control for Supply Chain Management, Fifth Edition, Tata McGraw-Hill Edition – Chapter Material Requirement Planning
6. Stop Watch Time Study of a Drill Press Operation
To study the stopwatch time procedure to determine the standard time of a job. Also determine the standard time for a drill job.
Reference:
 - i. Barnes, R.M., Motion and Time Study: Design and Measurement of Work, Seventh Edition, 1980, John Wiley & Sons, NY.
 - ii. International Labour Office Geneva, Introduction to Work Study, Universal Book Corporation
7. Visual Acuity Test
To study the visual acuity parameters such as dark adaptation capability, exposure time and target object size at a given luminance and to have a comparative study.
Reference:
 - i. Sanders, M.S., and McCormick, E.J., Human Factors in Engineering and design, McGraw-Hill International editions, Seventh Edition, 1993.
8. Method Study: Assembly and Disassembly Operation
To study the effect of fixture and layouts on the performance of an assembly and disassembly operation.
Reference:
 - i. Barnes, R.M., Motion and Time Study: Design and Measurement of Work, Seventh Edition, 1980, John Wiley & Sons, NY.
 - ii. International Labour Office Geneva, Introduction to Work Study, Universal Book Corporation
9. Pin Board Assembly
To study the effect of different methods of pin board assembly.
Reference:
 - i. Barnes, R.M., Motion and Time Study: Design and Measurement of Work, Seventh Edition, 1980, John Wiley & Sons, NY.
 - ii. International Labour Office Geneva, Introduction to Work Study, Universal Book Corporation