BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
AUGS/ AGSR Division

SECOND SEMESTER 2020-21
COURSE HANDOUT

Date: 18.01.2021

In addition to part I (General Handout for all courses appended to the Time table) this portion gives further specific details regarding the course.

Course No : **MBA G545**
Course Title : **Management Science**
Instructor-in-Charge : **DR. RAJESH MATAI**
Instructor(s) : **NA**
Tutorial/Practical Instructors: NA

1. Course Description: Management Science Approach to Problem Solving, Linear Programming (LP): Model Formulation and Graphical Solution, Linear Programming: Computer Solution and Sensitivity Analysis, Linear Programming: Modelling and Applications, Linear Programming: The Simplex Method, Transportation and Assignment Problem, Integer Programming (IP) and Goal Programming (GP), Waiting Lines and Queuing Theory Models, Simulation Modeling etc.

2. Scope and Objective of the Course:
Management Science aims to solve decision-making problems that confront and confound managers in real life by developing mathematical models of those problems. The course will be built on basics of mathematical modelling skills and then will focus on real life Applications and Solutions using software. Students will develop decision-making skills as outcome of this course. This course has become very significant in today's era of Analytics and today it is also called Prescriptive Analytics.

3. Text Books:

T1. Taylor, Bernard W.; Introduction to Management Science, Pearson Education, India, 9th Edition, 2008.

T2. Render, B., Stair, Jr., R.M., Hanna, M.E., and Badri, T.N.; Quantitative Analysis for Management, Pearson Education, India, 10th Edition, 2011.

4. Reference Books:

R1. Frederick S. Hillier and Mark S. Hillier; Introduction to Management Science: modeling and case studies approach with spreadsheets, McGraw-Hill Irwin, 5th Edition. 2019.

5. Course Plan:

Module No.	Lecture Session	Reference	Learning outcomes
(I) (i) Management Science Approach to Problem Solving	1-2	Chapter 1 (T1)	The Management Science Process
Linear Programming (LP): Model	3-6	Chapter 2 (T1)	Model Formulation, A Maximization Model, Graphical Solutions of

Formulation and Graphical Solution			Linear Programming Models, A Minimization Model, Irregular Types of Linear Programming Problems, Characteristics of Linear Programming Problems
(ii) Linear Programming: Computer Solution and Sensitivity Analysis	7-9	Chapter 3 (T1)	Computer/ Software Solution, Sensitivity Analysis
(iii)Linear Programming: Modeling and Applications	10-13	Chapter 4 (T1) Chapter 8 (T2)	A Product Mix Problem, A Diet Problem, An Investment Problem, A Marketing Problem, A Transportation Problem, A Blend Problem, A Multiperiod Scheduling Problem, A Data Envelopment Analysis Problem, A Production Scheduling Problem, An Employees Scheduling Problem, Other Linear Programming Applications
(iv) Linear Programming: The Simplex Method	14-17	Chapter 9 (T2)	Convert LP constraints to equalities with slack, surplus, and artificial variables, Set up and solve LP problems with simplex tableaus, Interpret the meaning of every number in a simplex tableau, Recognize special cases such as infeasibility, unboundedness, and degeneracy, Use the simplex tables to conduct sensitivity analysis

(II) (i)Transportation and Assignment Problem	18-21	Chapter 10 (T2)	Structure special LP problems using the transportation and assignment models, Use the northwest corner, VAM, MODI methods for solving transportation problem, Solve assignment problems with the Hungarian (matrix reduction) method
(ii) Integer Programming (IP) and Goal Programming (GP)	22-26	Chapter 11 (T2)	Understand the difference between LP and Integer Programming, Using Software to solve Integer Programming Problems (IPP), Some IP Applications, Apply the branch and bound method to solve IPP, Solving Goal Programming Problems (GPP) graphically, Goal Programming with Weighted Goals, Using Software for solving GPP
(III) (i) Waiting Lines and Queuing Theory Models	27-30	Chapter 14 (T2)	Waiting Line Costs, Characteristics of a Queuing System, Single-Channel Queuing Model with Poisson Arrivals and Exponential Service Times (M/M/1), Multichannel Queuing Model with Poisson Arrivals and Exponential Service Times (M/M/m), Constant Service Time Model (M/D/1), Finite

			Population Model (M/M/1 with Finite Source), Some General Operating Characteristic Relationships
(ii) Simulation Modelling	31-34	Chapter 15 (T2)	Introduction, Advantages, and Disadvantages of Simulation, Monte Carlo Simulation, Simulation of a Queuing Problem, Role of Computers in Simulation

6. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of component (Close Book/ Open Book)
Mid-Semester Test	90 Min.	20	To be Announced later	Close
Comprehensive Examination	3 h	40	To be Announced later	Close
Case Analysis		15		Open
Project		25		Open

Case Analysis: Cases will be assigned time to time. Students must read the case assigned, do proper analysis and come fully prepared for discussions in class. It is highly desired that students must attend all classes and contribute in case discussions.

Mini Project: Students will take any real Management Science problem and do projects in groups. At the end of semester, all groups will give presentation and submit report.

7. Chamber Consultation Hour: Friday after class.

8. Notices: All notices of this course will be displayed on the Department of Management Notice Board or Online.

9. Make-up Policy: Make-ups may be allowed only in genuine cases with prior permission of I/C.
10. Team Formation: Students have to give mini-project presentations in a team. Teams will be formed by Instructor.

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