Course code	Course Name	L-T-P - Credits	Year of Introduction
RLMCA108	OPERATIONS RESEARCH	3-1-0-4	2016

Course Objectives

- To introduce Operations research as a tool used to solve decision making problems in a wide range of areas.
- To impart different modeling techniques of real world problems and the various optimization techniques for solving these models.

Syllabus

Linear Programming model and various methods for solving the models- The transportation and assignment problems - Probabilistic models - game theory and queuing theory. Simulation models - the virtual running of a real world problem.

Expected Outcome

The students will be able to

i. Construct a mathematical model of a real world problem which has many alternative solutions which makes the decision maker unable to take a decision.
ii. Learn about various optimization methods that are employed to solve these mathematical models to find a solution which is in the best interest of the decision maker.

References

1. Hamdy A.Taha, "Operations Research-An Introduction", Prentice Hall of India
2. Kanti Swarup, P.K.Gupta and Man Mohan "Operations Research", Sultan Chand (2010).
3. Ravindran, Philips and Solberg, Wiley., "Operations Research", Second edition (2007), Wiley.

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	Introduction to O.R-Modeling in O.R -Solution methods for O.R- Methodology of O.R Linear Programming Problem-Formulation-Graphical method-Simplex method-Big M method-Two phase method.	8	15%
II	Duality in LPP-Statement of Duality theorems-Statement of complementary slackness theorem Solving LPP using duality-Dual simplex method.	9	15%
	FIRST INTERNAL EXAMINATION		
III	Transportation problem-Methods to find initial basic feasible solution-Northwest corner rule-Matrix minima method-Vogel's Approximation method. Solving a TP -MODI method –Degeneracy in TP-Unbalanced TP-Maximization in TP Assignment problem-Hungarian method of assignment-Maximization in assignment problem.	9	15%
IV	Game Theory-Two person zero sum game-Basic notions-saddle point-Maximin-Minimax principle. Games without saddle point-Mixed strategies-Algebraic method for solving two person zero sum game-Graphical method for 2xn and mx2 games-Dominance principle-Solving mxn game -using dominance-LPP method.	9	15%

V	Queuing theory-Elements of a queuing system-Kendall's notation-Operating characteristics-Poisson process-Exponential distribution-mean and variance-Birth and death process. Queuing models based on Poisson process-Single server models with finite and infinite capacity-Multi server models with finite and infinite capacity.	11	20%
SECOND INTERNAL EXAMINATION			
VI	Simulation-Methodology of Simulation-Simulation models-Event type simulation-Generation of Random numbers. Multiplication congruence algorithm-Inverse transformation method-Monte-Carlo simulation-Simulation of a queuing system.	10	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN

There will be two parts in the Question paper - **Part A and Part B.**

Part A will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions.

Part B will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in **Part B** to be limited to 2.

The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan.