DEPARTMENT OF MATHEMATICS

FACULTY OF SCIENCE AND HUMANITIES

SRM UNIVERSITY

PMA15204 – ADVANCED OPERATIONS RESEARCH

LESSON PLAN

The objective is to present the concepts and techniques to model and analyse optimization problems to solve real life problems.

The list of instructions (provided below) may be followed by a faculty relating to his/her own schedule includes warm up period, controlled/free practice, and the respective feedback of the classes who handle. The lesson plan has been formulated based on high quality learning outcomes and the expected outcomes are as follows:

Each subject must have a minimum of 56 hours, which in turn, 45 hours for lecture and rest of the hours for tutorials. The faculty has to pay more attention in insisting the students to have 95% class attendance.

UNIT – I: LINEAR PROGRAMMING		
Lect. No.	**Lesson Schedule**	**Cumulative hours**
L1.1	Introduction to transportation problem, LP formulation of TP existence of initial basic feasible solution-balanced TP	1
L1.1	North West corner rule and least cost method- problems.	2
L1.3	VAM method-problems	3
L1.4	MODI method- problems	4,5
L1.6	Unbalanced transportation problems and restrictions in transportation problems.	6
L1.7	Stepping stone method	7
L.1.8	Assignment model-LP formulation –Hungarian method	8
L.1.9	Travelling salesman problem	9
L.1.10	Duality- Writing dual of a given LPP-problems.	10
L.1.11	Solving LPP using duality	11
L.1.12	Tutorial	12
UNIT II: INTEGER PROGRAMMING		
L.2.1	Dual simplex method-problems.	13,14
L.2.3	Introduction to integer programming-Fractional cut method for all IPP-Construction of Gomory's constraints-problems.	14,15,16
L.2.6	Fractional cut method-Mixed IPP	17,18, 19
L.2.9	Branch and Bound method	20, 21, 22
L.2.12	Tutorial	23,24
CYCLE TEST 1:		**DATE:**
UNIT III: INVENTORY MODELS		

L.3.1	Introduction to inventory model-cost associated with inventory	25
L.3.2	Factors affecting inventories- Lead time, reorder level and ,EOQ	26
L.3.3	Deterministic models 1.Purchasing model with no shortages, production rate infinite-optimal lot size formula	27
L.3.4	Problems on model 1	28
L.3.5	2. Manufacturing model with no shortages-production rate finite-EOQ formula-problems	29
L.3.6	3.Purchasing model with shortages-problems	30
L.3.7	Manufacturing model with shortages-problems	32
L.3.8	Probabilistic model with setup cost-problems	33
L.3.9	Probabilistic model without setup cost-problems	34
L.3.10	Tutorial	35,36
CYCLE TEST 2:		**DATE:**
UNIT IV: NON-LINEAR PROGRAMMING		
L.4.1	Introduction to Non-linear programming problems-examples	37
L.4.2	Mathematical formulation of NLPP-Lagrange multiplier method-constrained optimization with equality constraints	38
L.4.3	Sufficient condition with one constraint-problems	39
L.4.4	Sufficient condition for general NLPP with equality constraints-problems	40,41
L.4.6	NLPP with inequality constraints-Khun-Tucker necessary conditions-problems.	43
L.4.7	Sufficiency of Khun-tucker conditions.-problems	44
L.4.8	Quadratic programming-Wolfe's modified simplex method.	45, 46
L.4.10	Tutorial	47,48
	SURPRISE TEST	
UNIT V: DYNAMIC PROGRAMMING		
L.5.1	Introduction-Bellman's principle of optimality- Characteristics of Dynamic programming problem	49,50
L.5.3	Optimal subdivision problem	51, 52
L.5.5	Solving some nonlinear problems using dynamic programming.	53,54,55
L.5.8	Solution of LPP by dynamic programming	56, 57,58
L.5.10	Tutorial	59,60
MODEL EXAM	**(Duration: 3 Hours)**	

TEXT BOOK:

Kanti Swarup, P.K. Gupta, and Manmohan, Operations Research, 14th edition, Sultan Chand & Sons, Reprint 2009.

REFERENCES:

1. Frederick S. Hillier & Gerald J. Lieberman, Introduction to Operations Research, McGraw-Hill: Boston MA; 8th. (International) Edition, 2005.
2. Ravindran, Philips and Soleberg,“ Operations Research – Principle and Practice“ Second Edition, John Wiley and sons, 2007.
3. Hadley.G, “Non-linear and dynamic programming”, Addison Wesley, 1964.
4. Hira,Gupta “Operaions Research” S.Chand Limited, 2008.

<table>
<tr><th colspan="5">Course Nature</th><th colspan="3">Theory</th></tr>
<tr><th colspan="8">Assessment method weightage (100 %)</th></tr>
<tr><td rowspan="2">End Semester
50%</td><td rowspan="2">Internal Assessment tool</td><td>Cycle test I</td><td>Cycle test II</td><td>Model</td><td>Regularity & Attendance</td><td>Assignment</td><td>Total</td></tr>
<tr><td>10%</td><td>10%</td><td>20%</td><td>5%</td><td>5%</td><td>100%</td></tr>
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