

GUJARAT TECHNOLOGICAL UNIVERSITY

Master in Computer Application (Integrated MCA)

Year II – (Semester-IV) (W.E.F. January 2015)

Subject Name: Operations Research

Subject Code: 4440602

1. Learning Objectives :

- The course is intended to provide basic understanding of Operation Research Techniques of strategic decision planning for optimum utilization of constraint resources in various span of human life viz. industry, business, commerce, administration, management, service supply, maintenance, agriculture, medicines and healthcare, defense etc.
- It is expected to emphasis on the algorithmic approach rather than on theoretical side. Mathematical derivations are not included for any topic identified.

2. Prerequisites: NIL

3. Contents : (*Mathematical Proofs or Derivations are not to be included*)

Unit No.	Course Content	No Of Lectures
I	<p>Basics of Operations Research and Linear Programming</p> <p>(i) Basics of Operation Research (2 Lect.) Operation Research introduction, definitions, features, advantages and applications</p> <p>(ii) Linear Programming Problem (L.P.P.) (7 Lect.) Linear Programming Problem (L.P.P.), Mathematical definition of a L.P.P. with its components: objective function and constraints, optimal solution, slack, surplus and artificial variables, Graphic method, Simplex method, Big – M method, Primal & Dual problem definition</p>	9
II	<p>Special Cases of L.P.P.</p> <p>(i) Transportation problem (T.P.) (5 Lect.) Mathematical definition of a T.P., Method to find initial basic feasible solution, NorthWest corner rule, Least cost cell entry method, Vogel’s approximation method, Test of optimality for finding an optimum solution – MODI method.</p> <p>(ii) Assignment problem (A.P.) (4 Lect.) Mathematical definition of an Assignment Problem, Method to find an optimum solution - Hungarian Method.</p>	9
III	<p>(i) Theory of Games (4 Lect.) Introduction, Two – Person Zero Sum game, Pure strategies (Minimax & Maximin principles) Games with saddle point, Rules to determine saddle point.</p>	10

	<p>(ii) Theory of Queues (4 Lect.) Introduction, Queuing system and problem, transient and steady states, traffic intensity, probability distributions in queuing systems, single service queuing model.</p> <p>(ii) Simulation (2 Lect.) Introduction, applications, Monte-Carlo Method, Simulation using Computers</p>	
IV	<p>Management of Inventory and Replacement</p> <p>(i) Management of Inventory (6 Lect.) Introduction and terminology of the inventory management Single Item Inventory Control Models without Shortages Model –I : EOQ model with constant rate of demand Model – II : EOQ model with different rate of demand.</p> <p>(ii) Management of Replacement (4 Lect.) Definition, replacement of items that deteriorates, replacement of item that fails completely.</p>	10
V	<p>Project Management and Scheduling</p> <p>(i) Project Management (CPM & PERT) (6 Lect.) Network concepts, components, rules for network construction, critical path method (CPM) and Project evaluation and Review Techniques (PERT)</p> <p>(ii) Production scheduling (job sequencing) (4 Lect.) Introduction, Johnson’s algorithm for n jobs 2 machines, Johnson’s algorithm for N jobs m machines, 2 jobs m machines using graphical method.</p>	10

4. Text Book:

J. K. Sharma, “Operations Research – Theory and Application”, 4th Edition, Macmillan Publishers India Ltd.

5. Reference Books:

1. Pradeep J Jha, “Operation Research”, Tata McGraw-Hill
2. Kanti Swarup, Gupta P.K. , Man Mohan, “Operations Research”, Sultan Chand & Sons, New Delhi
3. Shah, Gor, Soni, “Operations Research”, PHI
4. V. K. Kapur, “Operations Research – Problems & Solutions”, Sultan Chand & Sons, New Delhi

6. Chapter wise Coverage from Text Book:

Unit#	Name of Topic	Chapter	Subtopics
I	Basics of Operation Research	Ch – 1	1.1 to 1.4, 1.10, 1.13
	Basics of Linear Programming	Ch – 2	2.1, 2.2, 2.6, 2.7, 2.8
	Graphical Method of LPP	Ch – 3	3.1, 3.2, 3.3 (3.3.1, 3.3.2 & 3.3.3 only), 3.4
	Simplex Method of LPP Big-M Method of LPP	Ch – 4	4.1 to 4.6
	Duality in LPP	Ch – 5	5.1, 5.2
II	Transportation Problem	Ch – 9	9.1 to 9.5
	Assignment Problem	Ch – 10	10.1 to 10.3

III	Theory of Games	Ch – 12	12.1 to 12.3
	Theory of Queues	Ch – 16	16.1 to 16.6
	Simulation	Ch – 19	19.1 to 19.6
IV	Inventory Management	Ch – 14	14.1 to 14.7
	Replacement	Ch – 17	17.1 to 17.4
V	Project Management (CPM and PERT)	Ch – 13	13.1 to 13.6
	Job Sequencing	Ch – 20	20.1 to 20.3, 20.5, 20.6

7. Accomplishments of the student after completing the course :

- Ability to apply applications of optimization techniques of Operation Research in solving real-world problems.
- Ability to design and construct suitable optimization models to solve real life strategic problems – issues.

8. Recommendations for Lab Sessions : Tools to be Used - 'R' (Open Source Software available under Windows and Linux) and implementation is to be done in 'R'.