

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING**OPERATIONS RESEARCH**

(General Pool : Open Elective-II)

SYLLABUS FOR B.E. IV-SEMESTER

Instruction : 3Hrs /week	SEE Marks : 60	Course Code : U24OE420ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: understand the application of mathematics for real time problem solving to LPP, sensitivity analysis under set of constraints, applying mathematical techniques to solve transportation problem and assignment problems, applying time value money and ignoring the same to find the optimal replacement of machines, applying Johnsons rules to find the best sequence to minimize elapsed time and minimum no of servers to minimize waiting time of the customers and optimal utilisation of servers.	On completion of the course, the student will be able to: 1. Apply optimization in multidisciplinary areas through linear programming under different working conditions. 2. Analyze linear programming for a dynamic changes of a customer requirements to suit various Organizations. 3. Reduce total cost to apply for transportation techniques for the transshipment of Goods and products for a product based industry. 4. Estimate the time for replacement of a machine by considering or ignoring time value of money using individual/group replacement policy. 5. Estimate elapsed time for sequencing problem processed through different machines. Minimize waiting time of the customer and optimization of no. of servers.

CO-PO and CO-PSO mapping																		
CO	PO mapping													PSO mapping				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
CO1	1	3	2	1	2				1	2			2	1	2	1		
CO2	1	3	2	1					1	2			2	1	2	1		
CO3	1	3	2	2	1				1	2			2	1	2	1		
CO4	1	3	2	1					1	2			2	1	2	1		
CO5	1	3	2	2	1				1	2			2	1	2	1		

UNIT – I**Introduction:** Definition and scope of operations research.**Linear programming:** Introduction, Formulation of linear programming problems, graphical method of solving LP problem, Simplex method, maximization and minimization, degeneracy in LPP, unbounded and infeasible solutions. Introduction of software to solve LPP.**UNIT – II****Duality:** Definition, Relationship between optimal primal and dual solutions. Economic interpretation, Post optimal analysis (restricted to variation of resources i.e., RHS), Dual simplex method.**Transportation model:** Finding an initial feasible solution– north west corner method, least cost method, Vogel's approximation method, finding the optimal solution, optimal solution by stepping stone and MODI method, special cases in transportation problems – Unbalanced transportation problem.**UNIT-III****Assignment Problem:** Hungarian method of assignment problem, maximization in assignment problem, unbalanced problem, problems with restrictions, travelling salesman problem.**Replacement models:** Introduction, Replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly – individual replacement policy, group replacement policy.**UNIT-IV****Game theory:** Introduction, 2 person zero sum games, maximin– minimax principle, principle of dominance, solution for mixed strategy problems graphical method for $2 \times n$ and $m \times 2$ games.

UNIT-V

Sequencing models: Introduction, General assumptions, processing n jobs through 2 machines, processing n jobs through m machines processing 2 jobs through n machines.

Queueing theory: Introduction, Single channel – Poisson arrivals – exponential service times with infinite population and finite population.

Learning Resources:

1. Hamady A. Taha, "Operations Research – An introduction", 6th Edition, PHI Pvt. Ltd., 1997.
2. S.D. Sharma, "Operations Research", Kedarnath, Ramnath & Co., Meerut, 2009.
3. Harvey M. Wagner, "Principles of Operations Research", 2nd Edition, PHI Pvt. Ltd., 1980.
4. V.K. Kapoor, "Operations Research", S. Chand Publishers, New Delhi, 2004.
5. S.S. Rao, "Engineering Optimization – Theory and Practice", 4th Edition, John Wiley & Sons Inc., 2009.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 Minutes**