

**B.E Semester: 5 Automobile Engineering**  
**Subject Name: Resource Management (AE505-N-D)**  
**[Dept. Elect.-1]**

**A. Course Objective:**

- To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.
- This course provides strong foundation for understanding the fundamental principles and laws of Resource Management to understand Linear programming, network Analysis and queuing, replacement models. Students can understand and solve the problems regarding management and application of various models.

**B. Teaching / Examination Scheme:**

Teaching Scheme				Total Credit	Evaluation Scheme					Total
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
3	0	2	5	4	3	70	30	20	30	150

**C. Detailed Syllabus:**

Topic No.	Details
1	<b>Introduction to operations research:</b> Introduction and History of O.R., Definition and Characteristics of O.R., Scope and areas of application of O.R., Phases of O.R.
2	<b>Linear programming:</b> Introduction of linear programming (LPP), Mathematical formulation of the problem, graphical solution, simultaneous linear equations, slack and surplus variable, simplex method, procedure to obtain optimal solution by simplex method, approximation and equality, variable unrestricted design, alternative optimal solution minimization and Maximization problem BIG M and TWO PHASE methods, degeneracy. Duality in LPP, Dual problem and its construction, interpretation and properties, Dual simplex algorithm.
3	<b>Transportation techniques &amp; Assignments:</b> Mathematical statement of T.P. Methods to obtaining the initial basic feasible solution. (viz.: NWCR, VAM, LCEM ) optimal solution by stepping stone and MODI methods, Minimization and maximization problems, conditional allocations over time problems, Transshipment problem. Assignment Model Introduction, Types of methods to solve assignments model, Hungarian Method, Maximization problem and traveling salesman problem.
4	<b>Replacement theory:</b> Introduction, replacement of equipment that deteriorate and become obsolete, replacement of equipment that do not degenerate but fail., Replacement by alternative equipment, money value changing with times. Replacement with salvage value considered. Group replacement policy

5	<b>Queuing theory:</b> Introduction, input process, queue discipline, service mechanism, inter arrival times, service time, Kendall's notation queuing models, M/M/1 and with finite queue model with poisson arrival with exponential service, multi-channel queuing model. The [ M/M/1: ( /SIRO ) ] model III [ M/M/1 : ( N/FIFO ) ] model IV ( Birth death process M/M/C Queuing systems with M/M/C FIFO ) M/M/C (N/FIFO) M/M/C (C/FIFO) Queues in series.
6	<b>Network analysis:</b> Introduction, terms used in network analysis, arrow diagram, critical path method, programme evaluation and review technique, crashing of network.
7	<b>Inventory model:</b> Objective of inventory management, classification of inventory, inventory costs, inventory model with deterministic demand, inventory model with probabilistic demand, ABC analysis.

**Total hours (Theory):48**

**Total hours (Practical):32**

**Total hours:80**

#### D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1 <sup>st</sup> ,2 <sup>nd</sup>	Unit 1	20 %	1
2	3 <sup>rd</sup> ,4 <sup>th</sup> , 5 <sup>th</sup> , 6 <sup>th</sup>	Unit 2	20 %	2,4
3	7 <sup>th</sup> , 8 <sup>th</sup> ,9 <sup>th</sup>	Unit 3	20 %	3
4	10 <sup>th</sup> ,11 <sup>th</sup> , 12 <sup>th</sup>	Unit 4	20 %	5
5	13 <sup>th</sup> ,14 <sup>th</sup> , 15 <sup>th</sup> , 16 <sup>th</sup>	Unit 5	20 %	6,7

#### E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted toequivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overallinternal evaluation.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for theconcept being taught in lectures. Suggested list of experiment is given below

#### F. List of Practical:

1	Exercise on Game Theory
2	Study of Dynamic Programming problems.
3	Implementation of Simplex
4	Minimum spanning tree algorithm.
5	Exercise on Transportation techniques & Assignments.
6	Exercise on Replacement theory.
7	Exercise on Queuing theory.
8	Study on Network analysis.
9	Study on Inventory model.

#### G. Students Learning Outcomes:

1	Identify and develop operational research models from the verbal description of the real system.
2	Understand the mathematical tools that are needed to solve optimisation problems.
3	Use mathematical software to solve the proposed models.
4	Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

#### H. Text Books & Reference Books:

1	Quantitative Techniques in management, N.D. Vora – Tata McGraw Hill
2	Operations Research – An Introduction – Fifth edition by Hamdy A Taha- Prentice Hall of India , New Delhi.
3	Principles of Operations Research : With Applications to Management Decisions, Wagner, H.M. , Prentice-Hall of India, New Delhi, 1982.
4	Hillier, F.S. and Lieberman, G.J., Operations Research, Holden Day Inc., San Francisco, 1974.
5	Littlechild, S.C. (ed), Operational Research for Managers, Philip Allan, Oxford, 1977.
6	Mitchell, G.H. (ed), Operational Research Techniques and examples, The English Universities Press Ltd., London, 1972. Moder, J.J. and Elmaghraby, S.E. (ed.), Handbook of Operations Research: Models and Applications, Van Nostrand Reinhold Co., New York, 1987.
7	Payne, T. A., Quantitative Techniques for Management: A Practical Approach, Reston Publishing Co.Inc., Virginia, 1982. Wilkes, F.M., Baum, P. and Smith, G.D., Management Science: An introduction, John Wiley and Sons, Santa Barbara, 1979.