ME384: PDDC OPERATIONS RESEARCH
CREDITS = 3 (L=3, T=0, P=0)

Course Objective:

Apply the scientific methods, techniques and tools to the problem involving operations of systems (thereby formulating mathematical function) and provide optimum solutions to the given problems.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				
L	T	P	C	Theory		Practical		Total Marks
				ESE	CE	ESE	CE	
3	0	0	3	70	30	00	00	100

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Basics of Operations Research:** History, definition, operations research models, phases of implementing operations research in practice **Linear Programming Problem:** Introduction, Formulation, Graphical solution, Simplex method, Artificial variable techniques: Big-M and Two-phase methods, Special cases: degeneracy, multiple optima, unbounded solution, infeasible solution, Concept of Primal and Dual problems, Economic analysis of dual, Sensitivity analysis.	11
2	**Specially Structured Linear Programmes:** **Transportation Model:** LPP formulation of transportation problem, Initial feasible solution: North-West Corner rule, Least-cost method, Vogel's approximation method, Optimal solution: Stepping stone method, Modified Distribution (MODI) method,Special cases: unbalanced transportation problems, profit maximization, degeneracy, alternate optimal solutions, prohibited transportation routes, transshipment problems **Assignment Model:** LPP formulation of assignment problem, Hungarian method for solution and optimization, Special cases: alternate optimal solution, restrictions on assignment, maximization, crew layover problem, travelling salesman problem.	08
3	**Project Management:** Introduction to PERT and CPM, Terms used in network analysis, Network diagram, Fulkerson's rule, Concept of floats, PERT, Project cost analysis: Crashing of network, Resource smoothing and Resource leveling.	08

Unit No.	Topics	Teaching Hours
4	**Replacement Models:** Objective, Replacement of capital equipment which deteriorate with time (value of money unchanging and changing), Replacement of items that fail suddenly, Group replacement policy.	05
5	**Inventory Management:** Objectives of inventory management, Inventory classification, Inventory costs, EOQ, Inventory models with deterministic demand: Purchase model without and with quantity discount, Manufacturing model, Model with planned shortages, Inventory with safety stock, Inventory models with probabilistic demand, ABC analysis of inventory.	06
6	**Queuing Theory:** Terms used in queuing theory, Kendall's notation, Classification of queuing models, Preliminary analysis of single server models with infinite and finite queues.	04
	Total	**42**

List of References:

1. Vohra N. D ," *Quantitative Techniques in Management"*, 4th ed., Tata McGraw Hill
2. Sharma J. K., "*Operations Research: Theory and Applications"*, Macmillan India Ltd.
3. Taha H. A., "*Operations Research – An Introduction", 9th ed.*, Prentice Hall India
4. Wagner H. M., "*Principles of Operations Research"*, Prentice Hall India
5. Gupta P. K., Hira D.S., "*Operations Research",* S Chand Publishers

Course Outcomes (COs):

1. Formulate and solve to give optimum solution to the real life/industrial problem where constraint and objective function have linear mathematical functions or formulate and solve linear programming problems
2. Formulate and give optimum solution for a given transportation and assignment problems
3. Construct network diagram for planning, scheduling and control of a project
4. Decide the replacement period for a given machine/equipment on the cost consideration.
5. Manage the inventory or maintain the optimum inventory level
6. Analyze the queuing problem of single server models with infinite and finite queues.