



SWARNANDHRA

COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited by NBA, AICTE, NEW DELHI • Accredited by NAAC with "A" Grade – 3.32/4.00 CGPA

Recognized by UGC Under Sections 2(f) & 12 (B) of UGC Act 1956

Approved by AICTE, New Delhi, Permanent Affiliated to JNTU K, Kakinada

Seetharampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh

Department of Science & Humanity

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods/ Week	Academic Year	Date of Commencement of Semester
23HS7T05	OPERATIONS RESEARCH	VII	Mechanical, Robotics.	62/5	2026-27	17.06 .2026

Course Outcomes: After successful completion of this course, students should be able to:

1	To introduce the concepts of Linear Programming and mathematical modeling for industrial optimization. [K3]
2	To impart knowledge on specialized algorithms for Transportation, Assignment, and Sequencing problems to minimize costs and time. [K3]
3	To provide a framework for analyzing Replacement strategies and strategic interactions using Game Theory. [K3]
4	To enable students to model service systems via Queuing Theory and manage stock through Inventory Control techniques. [K3]
5	To explain Dynamic Programming and Simulation techniques for solving complex, multi-stage decision-making problems.[K4]

Unit	Outcome/Bloom's Level	Topics No.	Topics/ Activity	Text Book/ Reference	Contact Hour	Delivery Method
1	To introduce the concepts of Linear Programming and mathematical modeling for industrial optimization. [K3] (CO1)	LINEAR PROGRAMMING				
		1.1	Definition to Operations Research and its characteristics and phases	T ₁ ,T ₂ ,R ₂	1	Chalk & Talk, Active Learning, PPT & Tutorial
		1.2	Types of operation research models and its applications	T ₁ ,T ₂ ,R ₂	1	
		1.3	Linear programming Problem and Formulation	T ₁ ,T ₂ ,R ₂	1	
		1.4	Problems based on Linear programming Problem Formulation	T ₁ ,T ₂ ,R ₁	1	
		1.5	Graphical solution	T ₁ ,T ₂ ,R ₁	1	
		1.6	Simplex method introduction and definition		1	
		1.7	Simplex method -Simple problems	T ₁ ,T ₂ , R ₂	1	
		1.8	Artificial variable Technic – introduction Big M- Method -introduction,	T ₁ ,T ₂ , R ₂	1	
		1.9	Big M- Method- Simple problems		1	
					1	



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		1.10	Two Phase method-problems	T ₁ , T ₂ , R ₂	1	
					1	
		1.11	Duality Principle-conversion	T ₁ , T ₂	1	
		1.12	Duality Principle-Problems	T ₁ , T ₂	1	
		Total			15	
		TRANSPORTATION, ASSIGNMENT, SEQUENCING				
II	To impart knowledge on specialized algorithms for Transportation, Assignment, and Sequencing problems to minimize costs and time. [K3] (CO2)	2.1	Formulation of the Transportation Problem.-Definitions-Procedure to find optimal solution	T ₂	1	Chalk & Talk, Active Learning, PPT & Tutorial
		2.2	Initial basic feasible solution (IBFS) by various methods.	T ₁ , T ₂ , R ₂	1	
					1	
		2.3	Optimal solution for the Balanced Transportation Problem by MODI method.	T ₁ , T ₂ , R ₂	1	
					1	
		2.4	Degeneracy and Unbalanced Transportation Problem.	T ₁ , T ₂ , R ₂	1	
					1	
		2.5	Formulation of the Assignment Problem- Definitions-Procedure to find optimal solution	T ₁ , T ₂ , R ₂	1	
					1	
		2.6	Problems by UV method	T ₁ , T ₂ , R ₂	1	
		2.7	Travelling salesman problem	T ₁ , T ₂ , R ₂	1	
		2.8	Introduction, Optimal solution for processing n jobs through 2 machines.	T ₁ , T ₂ , R ₂	1	
					1	
		2.9	Optimal solution for processing n jobs through 3 machines.	T ₁ , T ₂ , R ₁	1	
		2.10	Processing n jobs through m machines	T ₁ , T ₂ , R ₁	1	
		Total			15	
		REPLACEMENT AND THEORY OF GAMES				
III	To provide a framework for analyzing	3.1	Replacement of items that deteriorate with time when money value is not counted	T ₁ , T ₂ , R ₂	1	Chalk & Talk, Active
					1	



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	Replacement strategies and strategic interactions using Game Theory. [K3] (CO3)	3.2	Replacement of items that deteriorate with time when money value is counted.	T_1, T_2, R_2	1	Learning, PPT & Tutorial
		3.3	Group Replacement	T_1, T_2, R_1	1	
					1	
		3.4	Introduction, Terminology, Applications, Definition	T_1, T_2, R_1	1	
		3.6	Minimax (Maximin) criterion and optimal strategy- solution of games with saddle points.	T_1, T_2, R_1	1	
		3.7	Rectangular games without saddle points. (oddment method)- 2 x 2 games and Dominance Principle	T_1, T_2, R_1	1	
					1	
		3.8	mx2, 2 x m games by graphical method	T_1, T_2, R_1	1	
Total					10	
IV	To enable students to model service systems via Queuing Theory and manage stock through Inventory Control techniques. [K3] (CO4)	WAITING LINES & INVENTORY				Chalk & Talk, Active Learning, PPT & Tutorial
		4.1	Introduction, Definitions	T_1, T_2, R_1	1	
		4.2	Single channel – Poisson arrivals. Exponential Service Times with finite and infinite population models		1	
					1	
		4.3	Multichannel – Poisson arrivals. Exponential Service Times with finite and infinite population models	T_1, T_2, R_1	1	
					1	
					1	
		4.4	Introduction, Various inventory costs	T_1, T_2, R_1	1	
		4.5	Deterministic models(Demand rate is uniform and non-uniform, production rate is finite &infinite)	T_1, T_2, R_1	1	
					1	
					1	
		4.6	Probabilistic models(Instantaneous and continuous demand and stock level is discrete and continuous and setup cost is zero and lead time is zero)	T_1, T_2, R_1	1	
					1	
					1	
		4.7	Purchase inventory models with one price break and multiple price breaks and ABC & VED Analysis	T_1, T_2, R_1	1	
					1	
1						
Total					16	

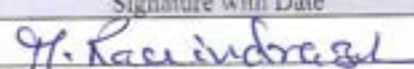
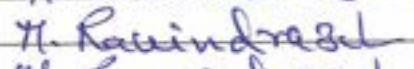
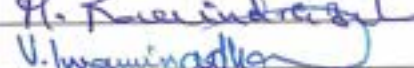


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V	To explain Dynamic Programming and Simulation techniques for solving complex, multi-stage decision-making problems[K4]. (CO5)	DYNAMIC PROGRAMMING AND SIMULATION				Chalk & Talk, Active Learning, PPT & Tutorial
		5.1	Introduction and Bellman's principle of optimality	T ₂ ,R ₂	1	
		5.2	Shortest path problem	T ₂ ,R ₂	1	
				T ₂ ,R ₂	1	
		5.3	Definition and types of simulation models	T ₂ ,R ₂	1	
		5.4	Phases of simulation and inventory problems	T ₂ ,R ₂	1	
				T ₂ ,R ₂	1	
Total				6		
Cumulative Proposed Periods				60		
Text Books:						
S. No.	Authors, Book Title, Edition, Publisher, Year of Publication					
1	Hamdy A.Taha, "Operations Research",10 th , Pearson-2017					
2	S.D.Sharma , Kedar Nath Ramnath "Operations Research", Latest, McMillan India-2019					
Reference Books:						
S. No	Authors, Book Title, Edition, Publisher, Year of Publication					
1	Frederick S. Hillier, Gerald J. Lieberman, Introduction to Operations Research, McGraw Hill (TMH), 11th Edition, 2021					
2	A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Operations Research, Pearson Education, 2nd Edition, 2009					
3	R.Panneerselvem, "Operations Research", Second Edition, PHI-2007.					
		Name		Signature with Date		
i.	Faculty	Mr. M. Ravindra babu				
ii.	Course Coordinator	Mr. M. Ravindra babu				
iii.	Module Coordinator	Mr. M. Ravindra babu				
iv.	HOD of S&H	Dr. V.Swaminadham				


Principal