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 Mathematics

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods/ Week	Academic Year	Date of Commencement of Semester
16MA7T01	OPERATIONS RESEARCH	IV/VII	ME	7	2021-22	4.10.2021

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

1	Apply linear programming techniques to solve industrial optimization problems (K3)
2	Solve transportation and assignment problems using operations research techniques.(K3)
3	Solve sequencing problems using operations research techniques. (K3)
4	Solve replacement problems for optimization.(K3)
5	Analyze game theory and apply them for optimization (K4)
6	Analyze queuing theory and apply it for optimization and also analyze inventory models for various industrial problems (K4)

Unit	Outcome/Bloom's Level	Topics No.	Topics/ Activity	TextBook/ Reference	Contact Hour	Delivery Method
			LINEAR PROGRAMMING			
I	Applylinear programming techniques to solve industrial optimization problems (CO1)	1.1	Introduction to Operations Research	T_1,T_2,R_2	1	PPT,BB
		1.2	Linear programming Problem Formulation	T_1,T_2,R_2	1	PPT,BB
		1.3	Problems based on Linear programming Problem Formulation	T_1,T_2,R_1	1	PPT,BB
		1.4	Graphical solution	T_1,T_2,R_1	1	PPT,BB
		1.5	Simplex method introduction and definition	T_1,T_2, R_2	1	PPT,BB
		1.6	Simplex method -problems	T_1,T_2, R_2	1	PPT,BB
				T_1,T_2, R_2	1	PPT,BB
		1.7	Artificial variable Technic – introductionBig M- Method - introduction,	T_1,T_2, R_2	1	PPT,BB
		1.8	Big M- Method-problems	T_1,T_2, R_2	1	PPT,BB
				T_1,T_2, R_2	1	PPT,BB
		1.9	Two Phase method- introduction &problems	T_1,T_2, R_2	1	PPT,BB
				T_1,T_2, R_2	1	PPT,BB
		1.10	Duality Principle-conversion	T_1,T_2	1	PPT,BB

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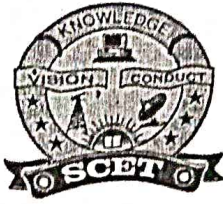**Seetharampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh**

		1.11	Duality Principle-Problems	T_1, T_2	1	PPT,BB
			Total		14	
			TRANSPORTATION & ASSIGNMENT PROBLEM			
II	Solve transportation and assignment problems using operations research techniques(CO2)	2.1	Formulation of Transportation Problem.-Definitions-Procedure to find optimal solution	T_2	1	PPT,BB
		2.2	Initial basic feasible solution (IBFS)by North-West corner rule(Procedure & problem)	T_1, T_2, R_2	1	PPT,BB
		2.3	IBFS by Row minimization, Column minimization &Least Cost Method(Procedure & problem)	T_1, T_2, R_2	1	PPT,BB
		2.4	IBFS by VAM(Procedure & problem)	T_1, T_2, R_2	1	PPT,BB
		2.5	Optimal solution by MODI method procedure with example	T_1, T_2, R_2	1	PPT,BB
				T_1, T_2, R_2	1	PPT,BB
		2.6	Optimal solution for Balanced Transportation Problem	T_1, T_2, R_2	1	PPT,BB
		2.7	Optimal solution for Unbalanced Transportation Problem	T_1, T_2, R_2	1	PPT,BB
		2.8	Optimal solution for Maximization Transportation Problem	T_1, T_2, R_2	1	PPT,BB
		2.9	Assignment problem,Formulation ,Definition-procedure of Hungarian method through balanced problem with example	T_1, T_2, R_2	1	PPT,BB
		2.10	Find optimal solution for unbalanced problem byHungarian method	T_1, T_2, R_1	1	PPT,BB
		2.11	Variations of Assignment Problem	T_1, T_2, R_1	1	PPT,BB
				T_1, T_2, R_1	1	PPT,BB
		2.12	Travelling Salesman Problem	T_1, T_2, R_1	1	PPT,BB
				T_1, T_2, R_1	1	PPT,BB
			Total		15	
III			**SEQUENCING PROBLEM**			

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Solve sequencing problems using operations research techniques. (CO3)	3.1	Introduction, Optimal solution for processing n jobs through 2 machines.	T_1, T_2, R_2	1	PPT,BB	
	3.2	Optimal solution for processing n jobs through 3 machines.	T_1, T_2, R_2	1	PPT,BB	
	3.3	Processing n jobs through m machines	T_1, T_2, R_1	1	PPT,BB	
			T_1, T_2, R_1	1	PPT,BB	
	3.4	processing 2 jobs through m machines (Graph)	T_1, T_2, R_1	1	PPT,BB	
			T_1, T_2, R_1	1	PPT,BB	
			Total	**6**		

		REPLACEMENT				
Solve replacement problems for optimization (CO4)	4.1	Introduction, Definitions	T_1, T_2, R_1	1	PPT	
			T_1, T_2, R_1	1	PPT,BB	
	4.2	Replacement of items that deteriorate with time when money value is not counted	T_1, T_2, R_1	1	PPT,BB	
			T_1, T_2, R_1	1	PPT,BB	
	4.3	Replacement of items that deteriorate with time when money value is counted.	T_1, T_2, R_1	1	PPT,BB	
			T_1, T_2, R_1	1	PPT,BB	
	4.4	Replacement of items that fail completely -Group Replacement	T_1, T_2, R_1	1	PPT,BB	
			Total	**7**		

		THEORY OF GAMES				
Analyze game theory and apply them for optimization (CO5)	5.1	Introduction, Terminology, Applications, Definition	T_1, T_2	1	PPT	
	5.2	Minimax (Maximin) criterion and optimal strategy- solution of games with saddle points.	T_1, T_2	1	PPT,BB	
			T_1, T_2	1	PPT,BB	
	5.3	Rectangular games without saddle points. (oddment method)- 2 x 2 games	T_1, T_2	1	PPT,BB	
	5.4	Dominance Principle	T_1, T_2	1	PPT,BB	
			T_1, T_2	1	PPT,BB	
	5.5	Arithmetic method (Oddment method)	T_1, T_2	1	PPT,BB	
	5.6	mx2, 2 x m games by graphical method	T_1, T_2	1	BB	
			T_1, T_2	1	BB	
			Total	**9**		

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			WAITINGLINES & INVENTORY			
VI	Analyze queuing theory and apply it for optimization and also analyze inventory models for various industrial problems (CO6)	6.1	Introduction – Definitions	T_2,R2	1	PPT,BB
		6.2	Single channel – poisson arrivals. Exponential Service times with infinite population model.(problems)	T_2,R2	1	PPT,BB
				T_2,R2	1	PPT,BB
				T_2,R2	1	PPT,BB
		6.3	Introduction, single item – deterministic models	T_2,R2	1	PPT,BB
		6.4	EOQ with uniform demand & without shortage	T_2,R2	1	PPT,BB
		6.5	EBQ with uniform demand & without shortage	T_2,R2	1	PPT,BB
		6.6	purchase inventory with one price break	T_2,R2	1	PPT,BB
		6.7	EOQ with multi price breaks	T_2,R2	1	PPT,BB
			Total		9	
			Cumulative Proposed Periods		60	

Text Books:

S. No.	Authors, Book Title, Edition, Publisher, Year of Publication
T1	S.D.Sharma , "Operations Research", Kedar Nath Ramnath &co,Meerut-2013
T2	P.K. Gupta, D.S. Hira, "Operations Research", S.Chand-2003.

Reference Books:

S. No	Authors, Book Title, Edition, Publisher, Year of Publication
R1	A.M. Natararajan, P.Subramani, A. Tamilarasi, "Operations Research", Pearson-2005.
R2	R. Panneerselvem, "Operations Research", Second Edition, PHI-2007.

Web Details

1	https://nptel.ac.in/courses/111104027/
2	https://www.youtube.com/watch?v=a52BtWkyjl0
3	https://nptel.ac.in/courses/112107214/4

		Name	Signature with Date
i.	Faculty	Dr.P.Prem Delphy-Mech-A & B	
		Mr. M. Ravindra Babu -Mech-C	
ii.	Course Coordinator	Dr.P.Prem Delphy	
iii.	Module Coordinator	Mr. M. Ravindra Babu	
iv.	HoD of Mathematics	Dr. S. Dharaja Devi	

Principal