SEMESTER S5

OPERATIONS RESEARCH

Course Code	PEMET528	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3: 0: 0: 0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To understand the role of Operations Research (OR) in decision making
2. To apply different OR techniques for solving managerial problems

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Introduction to Operations Research (OR) and Linear Programming: Basics of OR, Modelling approach, Linear Programming (LP), Formulation of LP models, Graphical method, Simplex method, Big-M Method. Transportation Problem: Mathematical Formulation, Initial Basic Feasible Solution, North West Corner method, Least Cost method, Vogel's Approximation Method, Optimality test by MODI method, Assignment problem, Hungarian method.	9
2	Sequencing Problem: Basic terminologies, Processing of n Jobs through 2machines, Processing of n Jobs through 3 machines, Processing n Jobs, through m machines. Game Theory: Games with saddle points, Games without saddle points – 2 x 2 games, Graphical method for m x 2 & 2 x n games	9

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3	Non-traditional Optimization Techniques: Genetic Algorithm (GA) – Working principles, GA Operators, Parameters setting, Constraints handling, Solving simple problems using GA. Simulated Annealing and Particle Swarm Optimization (Theory only) - Introduction, Key concepts, Algorithm.	**9**
4	Scope of queuing theory, Importance and applications, Kendall's Notations, Characteristics of Queuing Systems, Performance Measures in Queuing Systems, Classic Queuing Models, Single-server exponential arrival and service times, Two-server exponential arrival and service times.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	To formulate and solve linear programming problems and transportation problems	**K2, K3**
CO2	To apply basic sequencing techniques for processing jobs through machines	**K2, K3**
CO3	To solve simple problems in game theory	**K2, K3**
CO4	To apply evolutionary algorithms for optimization problems	**K2, K3**
CO5	To solve problems using classical queuing theory models	**K2, K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	2	-	-	-	-	-	-	-
CO2	2	2	-	-	2	-	-	-	-	-	-	-
CO3	2	2	-	-	2	-	-	-	-	-	-	-
CO4	2	2	-	-	3	-	-	-	-	-	-	-
CO5	2	2	-	-	2	-	-	-	-	-	-	-

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Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Operations Research-Principles and Applications	Srinivasan, G.	PHI Pvt. Ltd.	Third Edition, 2017
2	Operations Research	Prem Kumar Gupta & D. S. Hira,	S Chand publication	Third Edition, 2008
3	Quantitative Techniques in Management	N. D Vohra. Hitesh Arora	McGraw Hill.	Sixth Edition, 2021
4	Soft Computing Fundamentals and Applications	Dilip K. Pratikar	Alpha Science	2015

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Optimization: Theory and Applications	Rao, S.S.	Wiley eastern.	Second edition,
2	Introduction to Operations Research,	F. S. Hillier& G. J. Leiberman:	McGraw Hill	Eleventh Edition
3	Operations Research Principles and Practice	Ravindran, Phillips and Solberg,	Willey & Sons	1987
4	Operations Research,	Goel, B. S. and Mittal, S. K.,	Pragati Prakashan, Meerut	1999

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://onlinecourses.nptel.ac.in/noc24_ma55
2	https://onlinecourses.swayam2.ac.in/cec24_ma05
3	https://onlinecourses.swayam2.ac.in/cec24_ma05
4	https://onlinecourses.swayam2.ac.in/cec24_ma05

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