Department of Liberal Education
Era University, Lucknow
Course Outline
Effective From: 2023-24

Name of the Program	**B.A. / B.Sc. (LIBERAL EDUCATION)**			**Year/ Semester:**	**3rd / 5th**
Course Name	**Operations Research**	**Course Code:**	**ST301P**	**Type:**	**Practical**
Credits	**01**			**Total Practical Hours:**	**30 Hours**
Evaluation Spread	**Internal Continuous Assessment:**	**10 Marks**		**End Term Exam:**	**15 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	The objective of these practicals is to develop a thorough understanding of different optimization techniques and their applications in Operations Research, including mathematical formulation, graphical method, simplex method, Charne's Big M method, transportation model, assignment model, game payoff matrix, graphical solution to rectangular games, mixed strategy games, and LPP method for solving games.				

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	**Attributes**
CO1	Problem Formulation: Students will demonstrate the ability to convert real-world problems into mathematical optimization models, considering linear programming, transportation, assignment, and game theory formulations.
CO2	Solution Techniques: Students will acquire proficiency in using various solution techniques, including graphical method, simplex method, Charne's Big M method, transportation algorithm, and game theory strategies, to solve optimization problems efficiently and effectively.
CO3	Analysis and Interpretation: Students will develop the skills to analyze and interpret the results obtained from optimization models and algorithms. They will be able to assess the feasibility, optimality, and sensitivity of solutions, and provide insightful interpretations for decision-making.
CO4	Communication of Findings: Students will enhance their ability to communicate optimization findings and recommendations to stakeholders. They will effectively present complex concepts, explain solution approaches, and convey the practical implications of the results in a clear and concise manner.
Pedagogy	Interactive, discussion-based, student-centered. program outputs.
Internal Evaluation Mode	Experiment-Writing and Conductance File Maintenance/ Laboratory Record Continuous Attendance and Participation

Practical No.	**Experiments**	**Contact Hours**	**Mapped CO**
1.	Problem based on Mathematical formulation of L.P.P Problem based on solving LPP using Graphical Method	6	**CO1**
2.	Problem based on solving LPP using Simplex Method Problem based on solving LPP using Charne's Big M method involving artificial variables.	6	**CO1**
3.	Allocation Problem based on Transportation model.	6	**CO2**

	Allocation Problem based on Assignment model.		
4.	Problems based on Game payoff matrix. Problem based on solving Graphical solution to mx2/2xn rectangular game.	6	**CO4**
5.	Problem based on solving Mixed strategy game. Problem based on solving game using LPP method.	6	**CO4**

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1			2	2		1			1	3	3	3		
CO2			2	2		1			1	3	2	3		
CO3			2	3		2			1	3	2	3		
CO4			3	3		1			1	3	3	3		

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Reference Books	1. Hillier, F.A and Lieberman, G.J. (2010): Introduction to Operations Research- Concepts and cases, 9th Edition, Tata McGraw Hill 2. Hadley, G: (2002) : Linear Programming, Narosa Publications.
E-Resources	https://www.youtube.com/watch?v=Uo6aRV-mbeg. https://www.youtube.com/watch?v=qQFAvPF2OSI https://www.youtube.com/watch?v=D-OjaJzIu3M https://www.youtube.com/watch?v=dQDZNHwuuOY https://www.youtube.com/watch?v=n7kSe-k78RE https://www.youtube.com/watch?v=EwcjyxuwUkI https://www.youtube.com/watch?v=9CnH80sGMRg https://www.youtube.com/watch?v=O43EsgjJ-Kc

Internal Practical Evaluation:

Component	Marks
Experiment-Writing and Conductance	5
File Maintenance/ Laboratory Record	2
Continuous Attendance and Participation	1
Viva-Voce	2
Total Marks	10

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