

# **DARBHANGA COLLEGE OF ENGINEERING**

## **COURSE FILE**

**OF**

**Operational Research (021723)**



**Mr. Rajat Gupta**

**Assistant Professor**

**Department of Mechanical Engineering**

<b>College Name</b>	<b>Darbhanga College of Engineering</b>		
<b>Program Name</b>	<b>B.Tech Mechanical Engineering</b>		
<b>Course Name</b>	<b>Operational Research</b>		
<b>Course Code</b>	<b>02 1723</b>	<b>Course Credit</b>	<b>3</b>
<b>Lecture/Tutorial Per Week</b>	<b>03/0</b>		
<b>Course Coordinator Name</b>	<b>Mr. Rajat Gupta</b>		

### **Vision**

- To strengthen the region through imparting superior quality technical education and research; which enables the fulfillment of industrial challenge and establish itself as a Centre of Excellence in the field of Mechanical Engineering.

### **Mission**

- To build an academic environment of teaching and lifelong learning for students to make them competitive in context with advance technological, economical and ecological changes.
- To enable the students to enhance their technical skills and communications through research, innovation and consultancy projects.
- To share and explore the accomplishments through didactic, enlightenment, R & D programs with technical institution in India and abroad.

## **Student's Outcomes**

Students who complete the B.TECH degree in ME will be able to:

1. An ability to apply the knowledge of mathematics, basic sciences and engineering concepts to solve the complex engineering problems.
2. The ability to conduct experiments and to critically analyze and interpret the experimental data to reach at substantial outcomes.
3. An ability to design systems, components, or processes to meet appropriate needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. An ability to identify, formulates, and solves the complex engineering problems.
5. An ability to function on multi-disciplinary teams that leads the multi-disciplinary projects.
6. An understanding of professional and ethical responsibility.
7. An ability to communicate effectively with written, oral, and visual means.
8. An ability to understand the impact of engineering solutions in a global, environmental, economical and societal context.
9. An ability to recognize the need to engage in life-long learning.
10. An ability to attain knowledge of contemporary issues.

11. An ability to use the techniques, skills, and modern tools necessary for Mechanical engineering practice.

12. Possess ability to estimate costs, estimate quantities and evaluate materials for design and manufacturing purposes.

### **Course Outcomes**

At the end of the course students will be able to

1. Define and formulate linear programming problems and appreciate their limitations.
2. Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
3. Conduct and interpret post-optimal and sensitivity analysis and explain the primal-dual relationship.
4. Develop mathematical skills to analyse and solve integer programming and network

### **Reference books**

1. Rader, D. J. 2010, Deterministic Operations Research: Models and Methods in Linear Optimization, J. Wiley & Sons
2. Taha, H. A. 2007, Operations Research, 8th edn, Pearson
3. Taylor, B. W. III 2013, Introduction to Management Science, 11th edn, Prentice Hall
4. Schrage, L. 1997, Optimization Modeling with LINDO, 5th edn, Thomson
5. Winston, W. L. 2004, Operations Research: Applications and Algorithms, 4th edn, Thomson
6. Williams, H. P. 2013, Model Building in Mathematical Programming, 5th edn, Wiley

7. Hillier, F. S. and Lieberman, G. J. 2010, Introduction to Operations Research, 9th edn, McGraw-Hill.

## **Evaluation Scheme**

<b>Component 1</b>	Mid semester examination	20
<b>Component 2</b>	class test	5
<b>Component 3</b>	TA	5
<b>Component 4</b>	End Semester Examination	70
<b>Total</b>		100

## **Syllabus**

<b>Topics</b>	<b>No. of lectures</b>	<b>Weightage</b>
Introduction - Elementary concepts, objectives of operations research, Applications of OR in decision-making. Modeling in Operation Research. Linear Programming: Introduction, mathematical formulation of the problem, Graphical solution. Simplex technique for solving simple LP problems.	10	25%
Transportation and assignment models.  Queuing theory (single and double channel)	10	25%
Inventory Control - Introduction and general notations,	10	25%

Economic lot size models with known demand		
CPM and PERT and CPM-crashing networks	5	12%
Dynamic programming. Sequencing model (n jobs-2 machines), Replacement problems and Reliability theory	5	13%

**7. This document is approved by**

<b>Designation</b>	<b>Name</b>	<b>Signature</b>
<b>Course Co-ordinator</b>	Rajat Gupta	
<b>HOD</b>	Mr.Vishnu Singh	
<b>Principal</b>	Prof. Achintya	