

Operations Research

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| Semester: IV | Subject Code: BS41604 | Lectures: 60 |
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Objectives:

The syllabus aims in equipping the students with,

- An ability to develop the skills of mathematical analysis : Formulation, Deduction, Proof and Recursive thinking and a clear perception of innumerable power of mathematical ideas and tools
- The knowledge of various methods in operations research and the capacity to represent the given information in the mathematical form using the techniques in Operations Research to solve real life problems and draw relevant conclusion
- An ability to inculcate a positive attitude towards Mathematics and enjoy the triumph of solving interesting problems from different areas of the subject

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| Unit 1: Modeling With Linear Programming | 4 |
| <ul style="list-style-type: none"> • Introduction to Operations Research • Mathematical Formulation of L.P.P. • Graphical Method • Scope of Operations Research • Transition from Graphical to Algebraic Solution | |
| Unit 2: The Simplex Method | 10 |
| <ul style="list-style-type: none"> • Introduction • The Simplex method • Big M - Method • Special Cases in Simplex Method (Degeneracy, Unbounded solution) | |



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| Unit 3: Duality | 4 |
| <ul style="list-style-type: none"> • Introduction • Definition of a Dual Problem • Solution using Dual Problem • Economic Interpretation of Duality | |
| Unit 4: Transportation Model and it's Variants | 12 |
| <ul style="list-style-type: none"> • Introduction • Transportation Problems <ul style="list-style-type: none"> ➤ Definition and basic terminologies ➤ Initial Basic Feasible Solution by – <ul style="list-style-type: none"> i. North West Corner Method (NWCM) ii. Matrix Minima Method or Least Cost Entry Method (LCEM) iii. Vogel's Approximation Method (VAM) ➤ Optimum Solution by 'MODI' Method. ➤ Degeneracy in the solution of Transportation Problem <ul style="list-style-type: none"> i. At initial stage ii. During the optimization using MODI METHOD • The Assignment Model (Hungarian Method) <ul style="list-style-type: none"> ➤ Mathematical Model for Assignment Problem. ➤ Special Cases in Assignment Problem. | |
| Unit 5: Sequencing Problems | 10 |
| <ul style="list-style-type: none"> • Introduction • Definition of a Sequencing Problem • Processing n Jobs through Two Machines • Processing n Jobs through Three Machines • Processing two jobs through m Machines • Processing n Jobs through m Machines | |



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| Unit 6:Game Theory | 8 |
| <ul style="list-style-type: none"> • Introduction • Optimal Solution of Two-Person, Zero-Sum Games • Two-Person Zero-Sum Game with Saddle Point • Two Person Zero-Sum Game with Mixed Strategy • Solution to 2×2 game • Graphical Method for solving $2 \times n$ and $m \times 2$ games. • Sub game Method • Principle of Dominance and solving some simple Games. • Converting Game to L.P.P. | |

*Contact hours – 12 hours

Reference Books:

1. Hamdy A. Taha, *Operation Research (An Introduction)*, Ninth Edition. Prentice Hall India Sections: 2.1, 2.2, 3.1 –3.5, 4.1, 4.2, 5.1–5.4
2. P.K. Gupta and D.S. Hira, *Problems in Operations Research*, S. Chand and Company Ltd. Sections: Chp. 2, Chp. 3, 4.1 –4.3, Chp. 5, Chp. 6, Chp. 10, Chp. 11, 12.1–12.6, 14.6 –14.15
3. S. D. Sharma, *Operations Research*, KNRN Publishers.
4. R. Panneerselvam. *Operations Research*, Prentice Hall India.
5. H. M. Wagner, *Principles of Operations Researc*, Pre ntice Hall India.
6. J.K. Sharma, *Operation Research*, 5th Edition Laxmi Publications, New Delhi.

