



**Mathematics Paper II
Operations Research**

Semester: IV	Credits: 2	Subject Code: BS42104	Lectures: 36
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Course Outcomes:
<p>At the end of this course, the learner will be able to:</p> <ul style="list-style-type: none"> ● Develop the skills of mathematical analysis: Formulation, Deduction, Proof and a clear perception of mathematical ideas and tools. ● Illustrate the applications of Operations Research and formulate a linear programming problem and apply appropriate method to solve it. ● Illustrate and analyze the managerial problems in the industry and use the resources (Machines, Materials, Staff etc.) more effectively. ● Build and solve Transportation problem and Assignment problem using suitable method. ● Compare the initial solutions of Transportation problems obtained by different methods and obtain the optimality of the solution. ● Solve the Sequencing problem by identifying the type of the problem and obtain the optimal sequence.

Unit 1: Modeling With Linear Programming	4
<ul style="list-style-type: none"> ● Introduction to Operations Research ● Scope of Operations Research ● Mathematical Formulation of L.P.P. ● Graphical Method 	

Unit 2: Simplex Method	10
<ul style="list-style-type: none"> ● Theory of Linear Programming, Slack and surplus variables, Standard form of LPP ● Some important definitions, Assumptions in LPP, Limitations of Linear programming, Applications of Linear programming, Advantages of Linear programming Techniques ● Simplex method, Big- M Method ● Special cases in LPP: Alternative Solution, Unbounded Solution, Infeasible Solution 	

Unit 3: Duality and Simplex	6
<ul style="list-style-type: none"> ● Duality in Linear Programming ● Primal to dual conversion, Examples. 	

Unit 4: Transportation Problems and its Variants	10
<ul style="list-style-type: none"> ● Introduction, Tabular representation ● Methods of IBFS <ul style="list-style-type: none"> ○ North-West Corner Method (NWCM) ○ Matrix-Minima Method or Least Cost Entry Method (LCEM) ○ Vogel's Approximation Method (VAM) ● The Optimality Test of Transportation Model (MODI method only) ● Special Cases in Transportation Problems <ul style="list-style-type: none"> ○ Unbalanced Transportation Problems 	

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● Simpson's Three-Eight Rule	
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Unit 4: Numerical Solution of Ordinary Differential Equation	8
<ul style="list-style-type: none"> ● Euler's Method ● Euler's Modified Method ● Runge-Kutta Methods <ul style="list-style-type: none"> ○ Runge-Kutta Method of order Two ○ Runge-Kutta Method of order Four ○ Convergence of Runge Kutta Method 	

No. of Lectures = 36 + 12 (Contact Hours) = 48 (Total)

Recommended Text Books:
<ul style="list-style-type: none"> ● A. K. Jaiswal and Anju Khandelwal, <i>A Textbook of Computer Based Numerical and Statistical Techniques</i>, New Age International Publishers, Year : January 2009 Unit 1: Chapter 2: Sections 2.1, 2.5, 2.7 Unit 2: Chapter 3: Sections 3.1, 3.2, 3.4, 3.5, Chapter 4: Sections 4.1, 4.2, 4.3 Unit 3: Chapter 6: Sections 6.1, 6.3, 6.4, 6.5, 6.6, 6.7 Unit 4: Chapter 7: Sections 7.1, 7.4, 7.5, 7.6

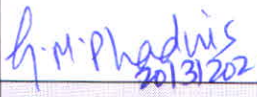
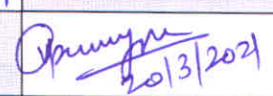
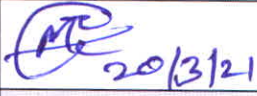
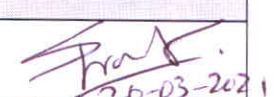
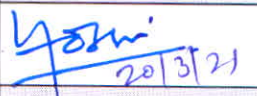
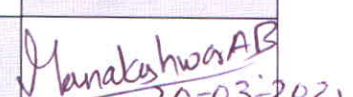

Reference Books:
<ul style="list-style-type: none"> ● E. Balgurusamy, <i>Numerical Methods</i>, Tata McGraw-Hill Publishing Company Limited, 1999 ● H.C. Saxena, <i>Finite differences and Numerical Analysis</i>, S. Chand and Company, 1 December 2010 ● Jain, Iyengar, Jain, <i>Numerical Methods</i>, New Age International Publishers, Third Edition - 1 January 2020. ● K.E. Atkinson, <i>An Introduction to Numerical Analysis</i>, Wiley Publications, 26 September 2008 ● S.S. Sastry, <i>Introductory Methods of Numerical Analysis</i>, 3rd edition, Prentice Hall of India, 1999

Websites:
<ul style="list-style-type: none"> ● http://mathforcollege.com/nm/topics/textbook_index.html

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(SY B.SC(CS) 2021-2024)

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