



Mathematics Paper-II
Numerical Analysis
[CORE COURSE]

Semester: III	Credits: 2	Subject Code: BS32104	Lectures: 36
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Course Outcomes:

At the end of this course, the learner will be able to:

- Demonstrate understanding of common numerical methods and how these methods are used to obtain solutions of mathematical problems.
- Derive and apply numerical methods to obtain best approximations to the exact solutions of non-linear equations, Linear Systems, Interpolation problems, Integration problems and Ordinary Differential Equations.
- Analyze and evaluate the convergence and accuracy of different numerical methods and thus compare the methods.
- Equip with mathematical modelling abilities, problem solving skills, Selection of appropriate method etc.

Unit 1: Algebraic and Transcendental Equations

8

- Introduction to Errors
- False Position Method
- Newton Raphson Method
 - Convergence of Newton Raphson Method

Unit 2: Calculus of Finite Differences and Interpolation

12

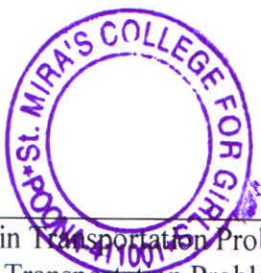
- Differences
- Forward Differences
- Backward Differences
- Shift Operator, Inverse Shift Operator
- Central Difference Operator and Average Difference Operator
- Properties of Operators
- Relation between Operators
- Newton Gregory Formula for Forward Interpolation
- Newton Gregory Formula for Backward Interpolation
- Lagrange's Interpolation Formula
- Divided Differences – Formula, Properties
- Newton's Divided Difference Interpolation Formula

Unit 3: Numerical Integration

8

- General Quadrature Formula
- Trapezoidal Rule
- Simpson's One-Third Rule

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<ul style="list-style-type: none"> ○ Maximization in Transportation Problems ○ Degeneracy in Transportation Problems ● The Assignment Model (Hungarian Method) <ul style="list-style-type: none"> ○ Mathematical Model for Assignment Problem. ○ Special Cases in Assignment Problem - Unbalanced Assignment Problem, Maximization in Assignment Problem, Assignment Problem with restrictions, Travelling Salesman Problem 	
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Unit 5: Sequencing Problems	6
<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 	

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

Recommended Textbooks:
<ul style="list-style-type: none"> ● P.K. Gupta and D.S. Hira. <i>Operations Research</i>. S. Chand and Company Ltd., 1 January 2015 Sections: Chp. 2, Chp. 3, 4.1 –4.3, Chp. 5, Chp. 6, Chp. 10, Chp. 11, 12.1–12.6 ● S.D.Sharma, <i>Operation Research</i> (12th Edition) 1998 Unit 1: Chapter 1: Sec. 1.1, 1.3-1, 1.3-2, 1.5, 1.6, 1.8, 1.9, 1.10, 1.11, 1.12, Chapter 3: Sec. 3.1, 3.2, 3.3, 3. 4, 3.5-4, Unit 2: Chapter 3: Sec. 3.8-1,3.8-2, Chapter 5: Sec. 5.1-1, 5.2-1,5.3,5.7-1, 5.7-2 Unit 3: Chapter 9: Sec. 9.1, 9.2, 9.4-1, 9.4-2, 9.5, 9.6, 9.7-1, 9.7-2 Unit 4: Chapter 10: 10.1, 10.2, 10.5, 10.8-1,10.9, 10.10


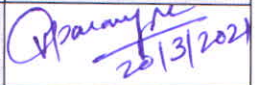
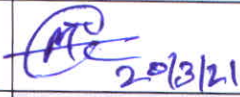
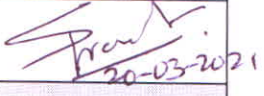

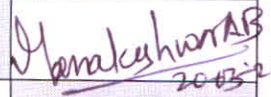
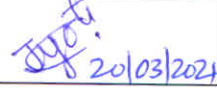
Reference Books:
<ul style="list-style-type: none"> ● H. A. Taha, <i>Operations Research An Introduction</i>, Pearson Publication, 10th Edition 2017 ● H. M. Wagner, <i>Principles of Operations Research</i>, Prentice Hall of India, 2004. ● J.K. Sharma, <i>Operation Research</i>, Laxmi Publications, 1 January 2017 ● R. Panneerselvam, <i>Operations Research</i>, Prentice Hall of India, 2005

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

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(SY BSC(CS) 2021-2024)

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VC Nominee (SPPU)	Dr. Vinayak Joshi		
Industry Expert	Mr. Anup Manakeshwar		
Alumni	Ms. Jyoti Sharma		

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