

**NEP – 2020: Syllabus of UG  
(Minor from Vocational Mathematics)  
Credits 04**

Undergraduate Certificate Courses (Minor from Vocational Mathematics) Semester Written Exam: Full Marks – 75. (Pass Marks – 30) Semester Viva-Voce: Full Marks – 25. (Pass Marks – 10)	
<b>General Instructions</b>	
There will be two groups of questions. Group – A will be compulsory and contain two questions, Question No. 1. contains very short answer type five questions throughout the Syllabus of 01 mark each whereas Question No. 2. contains two questions throughout the Syllabus of five marks each. Group – B will contain descriptive answer type seven questions of fifteen marks each, out of which four are to be answered.	
Year/ Semester	Paper Title & Study Materials
First (Introductory Courses) Semester - II	<p><b>Probability and Statistics</b></p> <p><b>Unit 1: Probability</b> Introduction, Events &amp; Different Types of Events, Addition &amp; Multiplication Law, Conditional Probability, Bay's Theorem, Random Variables, Probability Function, Binomial Poisson &amp; Normal Distribution. (02 Questions)</p> <p><b>Unit 2: Statistics</b> Definition, Function &amp; Scope of Statistics, Arithmetic Mean, Weighted A.M., Median, Mode, Geometric &amp; Harmonic Mean, and Their Merits &amp; Demerits. Range, The Interquartile Range or Quartile Deviation, Average (Mean), Deviation Standard Deviation, Coefficient of Variation, Skewness, Moments &amp; Kurtosis. (02 Questions)</p> <p><b>Unit 3: Correlation &amp; Regression Analysis</b> Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient. Difference Between Correlation &amp; Regression, Regression Lines, Regression Equations, Regressions Coefficient. (03 Question)</p> <p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>S.P. Gupta &amp; M.P. Gupta, "Business Statistics", Sultan Chand &amp; Sons.</li> <li>S.C. Gupta &amp; V.K. Kapoor, "Fundamental of Mathematical Statistics", Sultan Chand &amp; Sons.</li> </ol>

*Handwritten signature*  
06/05/2024

**NEP – 2020: Syllabus of UG  
(Minor from Vocational Mathematics)  
Credits 04**

Undergraduate Certificate Courses (Minor from Vocational Mathematics)

Semester Written Exam: Full Marks – 75. (Pass Marks – 30)

Semester Viva-Voce: Full Marks – 25. (Pass Marks – 10)

**General Instructions**

There will be two groups of questions. Group – A will be compulsory and contain two questions, Question No. 1. contains very short answer type five questions throughout the Syllabus of 01 mark each whereas Question No. 2. contains two questions throughout the Syllabus of five marks each. Group – B will contain descriptive answer type seven questions of fifteen marks each, out of which four are to be answered.

Year/  
Semester

Paper Title & Study Materials

First - Second  
(Intermediate Level Courses)  
Semester - IV

**Optimization Techniques**

**Unit 1: Linear Programming- Applications and Model Formulation**

Introduction, Structure of Linear Programming Model, Advantages of Using Linear Programming, Limitations of Linear Programming, Applications Areas of Linear Programming, General Mathematical Model of Linear Programming Model, Guidelines on Linear Programming Model Formulation, Examples of LP Model Formulation. Introduction, Important Definitions, Graphical Solution Methods of LP Problem.

(02 Questions)

**Unit 2: Linear Programming- The Simplex Method**

Introduction, Standard Form of an LP Problem, Simplex Algorithm (Maximization Case), Simplex Algorithm (Minimization Case).

(02 Questions)

**Unit 3: Transportation & Assignment Problem**

Introduction, Mathematical Model of Transportation Problem, The Transportation Algorithm, Methods for Finding Initial Solution. Introduction, Mathematical Model of Statement Assignment Problem, Solution Methods of Assignment Problem. (03 Questions)

**Text Book:**

1. J.K Sharma- Operations Research Theory & Applications, 3rd Edn, Macmillan India Ltd., New Delhi-2007.

**Reference Book:**

1. H.A. Taha-Operations Research: An Introduction, Pearson Education, New Delhi, 2006.

*[Signature]*  
06/05/2024

**NEP – 2020: Syllabus of UG  
(Minor from Vocational Mathematics)  
Credits 04**

Undergraduate Certificate Courses (Minor from Vocational Mathematics)

Semester Written Exam: Full Marks – 75. (Pass Marks – 30)

Semester Viva-Voce: Full Marks – 25. (Pass Marks – 10)

**General Instructions**

There will be two groups of questions. Group – A will be compulsory and contain two questions, Question No. 1. contains very short answer type five questions throughout the Syllabus of 01 mark each whereas Question No. 2. contains two questions throughout the Syllabus of five marks each. Group – B will contain descriptive answer type seven questions of fifteen marks each, out of which four are to be answered.

Year/  
Semester

Paper Title & Study Materials

First Time  
(Higher Level Courses)  
Semester - VI

**Numerical Methods**

**Unit 1: Solution of Algebraic and Transcendental Equations**

Introduction, Bisection method, Iteration method, Method of False Position, Newton-Raphson method, Graeffe's Root-Squaring method.

(02 Questions)

**Unit 2: Interpolation**

Introduction, Errors in Polynomial Interpolation, Finite Differences, Backward and Central, Detection of errors using Difference tables, Differences of a Polynomial, Newton's formulae for Interpolation, Central Difference Interpolation Formulae- Gauss's Central Difference Formula, Stirling's and Bessel's Formulae, Interpolation with unevenly spaced points, Lagrange's Interpolation Formula, Divided Differences and their properties- Newton's General Interpolation Formula, Inverse Interpolation.

(03 Questions)

**Unit 3: Numerical Differentiation and Integration**

Introduction, Numerical Differentiation and Errors, Numerical Integration – Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Weddle's Rule, Romberg Integration, Newton- Cotes Integration Formulae.

(02 Questions)

**Text Book:**

1. S. S. Sastry -Introductory methods of Numerical Analysis, 4th Edition, Prentice Hall of India, New Delhi, 2006

**Reference Books:**

1. V. N. Vadamurthy et. al.-Numerical Methods, Vikas Publishing House, New Delhi, 2005.
2. B. S. Grewal- Numerical Methods in Engineering & Science, Khanna Publishers, Delhi, 2005.

*[Signature]*  
06/05/2024

**NEP – 2020: Syllabus of UG  
(Minor from Vocational Mathematics)  
Credits 04**

Undergraduate Certificate Courses (Minor from Vocational Mathematics)  
Semester Written Exam: Full Marks – 75. (Pass Marks – 30)  
Semester Viva-Voce: Full Marks – 25. (Pass Marks – 10)

**General Instructions**

There will be two groups of questions. Group – A will be compulsory and contain two questions, Question No. 1. contains very short answer type five questions throughout the Syllabus of 01 mark each whereas Question No. 2. contains two questions throughout the Syllabus of five marks each. Group – B will contain descriptive answer type seven questions of fifteen marks each, out of which four are to be answered.

Year/ Semester	Paper Title & Study Materials
<b>First- Fourth</b> (Advanced Courses) Semester - VIII	<p><b>Algebra</b></p> <p><b>Unit 1: Abstract Algebra</b> Group, General properties of groups, Subgroups, properties of subgroups, Ring, Integral Domain, Field. <span style="float: right;">(03 Questions)</span></p> <p><b>Unit 2: Linear Algebra</b> Spaces and Subspaces, Basic and Dimension of Vector Spaces, Linear Transformation, Their Nullity and Rank. <span style="float: right;">(02 Questions)</span></p> <p><b>Unit 3: Matrix Algebra</b> Elementary Transformation, Inverse of a Matrix by Row Operation, Rank, Solution of a System of Linear Simultaneous Equation by Matrix Methods, Eigen Values, and Eigen Vectors, Quadratic Forms. <span style="float: right;">(02 Questions)</span></p> <p><b>TEXTBOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Modern Algebra By A. R. Vasishtha. Krishna Prakashan Media (P) Ltd Meerut.</li> <li>2. "Matrices" By A. R. Vasishtha. Krishna Prakashan Media (P) Ltd Meerut.</li> <li>3. "Analytical Geometry of The Dimensions" By Dasguta Prasad, Bharti Bhawan</li> <li>4. "Advanced Course in Modern Algebra" By Prof Dr.K.K.Jha, New Bharat Prakashan Delhi- 6.</li> <li>5. "Krishna Series" Analytical Geometry of three Dimension" By A. R. Vasishtha. Krishna Prakashan Media (P) Ltd Meerut.</li> </ol>

*[Signature]*  
06/05/2024