S. No.	Existing	Proposed
1	Skill Enhancement Courses (SEC) offered to B.Sc. (H) Mathematics (in 3rd and 4th Semester) are of 3 Credits	Since these courses should of 4 Credits according to UGC Guidelines, amendments have been made in the existing Courses to make them of 4 Credits
2	Skill Enhancement Courses (SEC) offered to B.A./ B.Sc. Programme (in 3rd, 4th, 5th and 6th Semesters) are of 3 Credits	Since these courses should of 4 Credits according to UGC Guidelines, amendments have been made in the existing Courses to make them of 4 Credits
3	Only One Generic Elective Paper is offered (in 1st, 2nd and 3rd Semester) to students of B.Sc. (H), B.A. (H) & B.Com (H) other than B.Sc. (H) Mathematics.	Two Generic Elective Papers are now offered each semester to students of B.Sc. (H), B.A. (H) & B.Com (H) other than B.Sc. (H) Mathematics.
4	No Generic Elective papers were being offered to students of B.A, B.Sc. & B.Com Programme in the 5th and 6th Semester	Generic Elective papers are now offered to students of B.A, B.Sc. & B.Com Programme in the 5th and 6th Semester

SKILL ENHANCEMENT COURSES (SEC)
IN
B.A/ B.Sc. PROGRAMME

Semester	Core Course (12)	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (4)	Discipline Specific Elective (DSE) (4)	Generic Elective (GE) (2)
I					
II					
III			SEC-1 (Mathematical Typesetting System: LaTeX)		
IV			SEC-2 (Computer Algebra Systems)		
V			SEC-3 (Statistical Software: R)		
VI			SEC-4 (Transportation and Network Flow Problems)		

SEC-1: Mathematical Typesetting System: LaTeX

4 Credits (2 Lectures + 4 Practical per week)
Theory: 50 marks (including internal assessment)
Practical: 50 marks

Introduction to TeX and LaTeX, typesetting a simple document, adding basic information to documents, environments, footnotes, sectioning and displayed material

Assents and symbols, Mathematical Typesetting (Elementary and Advanced): subscript/ superscript, fractions, roots, ellipsis, mathematical symbols, arrays, delimiters, multiline formulas, spacing and changing style in math mode

Graphics in LaTeX, simple pictures using PS Tricks, Plotting of functions

Beamer Presentation

[1] Chapter 9 (9.1-9.8), Chapter 10 (10.1-10.3), Chapter 11 (11.1-11.4)
[2] Chapter 2 (2.1-2.5), Chapter 3 (3.1-3.3), Chapter 7 (7.1-7.2)

Practical
(Ideal Lab Practical Batch Size: 15-20 Students)
[1] Chapter 9 (Exercises 4-10), Chapter 10 (Exercises 1, 3, 4, 6-9), Chapter 11 (1, 3, 4, 5).

References:
[1] Martin J. Erickson and Donald Bindner, *A Student's Guide to the Study, Practice, and Tools of Modern Mathematics*, CRC Press, Boca Raton, FL, 2011.
[2] L. Lamport, *LATEX: A Document Preparation System, User's Guide and Reference Manual*. Addison-Wesley, New York, 2nd edition, 1994.

SEC-2: Computer Algebra Systems

4 Credits (2 Lectures + 4 Practical per week)
Theory: 50 marks (including internal assessment)
Practical: 50 marks

Computer Algebra Systems (CAS), use of a CAS as a calculator

Computing and plotting functions in 2D, Customizing Plots, Animating plots, producing table of values, working with piecewise defined functions, combining graphics

Simple Programming in a CAS

Applications in Algebra: Factoring, expanding and finding roots of polynomials, working with rational and trigonometric functions, solving general equations

Applications in Calculus: Computing limits, first and higher order derivatives, maxima and minima, integration, computing definite and indefinite integrals

Working with matrices, performing gauss elimination, operations (transpose, determinant, inverse), minors and cofactors, solving system of linear equations, rank and nullity of a matrix, eigenvalue, eigenvector and diagonalization

[1] Chapter 12 (12.1-12.5)
[2] Chapter 1, Chapter 3 (3.1-3.6, 3.8), Chapter 4 (4.1-4.3, 4.5-4.7, 4.9), Chapter 5 (5.1, 5.3, 5.5, 5.6, 5.10, 5.11), Chapter 7 (7.1-7.4, 7.6-7.8)
Note: Theoretical and Practical demonstration should be carried out only in one of the CAS: Maxima/ Mathematica/ Maple or any other.

Practical
(Ideal Lab Practical Batch Size: 15-20 Students)
[1] Chapter 12 (Exercises 1-4, 8-12)
[2] Chapter 3 [Exercises 3.2 (1), 3.3 (1, 2, 4), 3.4 (1, 2), 3.5 (1-4), 3.6 (2, 3)], Chapter 4 [Exercises 4.1, 4.2, 4.5, 4.7, 4.9], Chapter 5 [Exercises 5.1 (1), 5.3, 5.5, 5.6 (1, 2, 4), 5.10 (1, 3), 5.11 (1, 2)], Chapter 7 [Exercises 7.1 (1), 7.2, 7.3 (2), 7.4 (1), 7.6]

References:
[1] Martin J. Erickson and Donald Bindner, *A Student's Guide to the Study, Practice, and Tools of Modern Mathematics*, CRC Press, Boca Raton, FL, 2011.
[2] Bruce F. Torrence and Eve A. Torrence, *The Student's Introduction to MATHEMATICA: A Handbook for Precalculus, Calculus, and Linear Algebra*, Cambridge University Press, 2009.

Page 3

SEC-3: Statistical Software: R

4 Credits (2 Lectures + 4 Practical per week)
Theory: 50 marks (including internal assessment)
Practical: 50 marks

Introducing R, Using R as a calculator, Reading and getting data into R: combine and scan commands, viewing named objects and removing objects from R, types and structure of data items with their properties, working with history commands, saving work in R

Manipulating vectors, data frames, matrices and lists, viewing objects within objects, constructing data objects and their conversions

Summary commands, Summary statistics for vectors, data frames, matrices and lists, summary tables

Stem and leaf Plot, Histogram, density function and its plotting

Plotting in R, Box-whisker Plots, Scatter Plot, Pairs Plot, line charts, Pie Chart, Cleveland Dot Charts, Bar Charts, saving graphs

[1] Chapter 14 (14.1-14.4, 14.7)
[2] Chapters 2-5, 7

Practical
(Ideal Lab Practical Batch Size: 15-20 Students)
[1] Chapter 14 (Exercises 1-3)
[2] Relevant exercises of Chapters 2-5, 7
The practical may be done on the database to be downloaded from https://data.gov.in/

References:
[1] Martin J. Erickson and Donald Bindner, *A Student's Guide to the Study, Practice, and Tools of Modern Mathematics*, CRC Press, Boca Raton, FL, 2011.
[2] M. Gardener, *Beginning R: The Statistical Programming Language*, Wiley Publications, 2012.

SEC-4: Transportation and Network Flow Problems

4 Credits (3 Lectures + 2 Practical per week)
Theory: 75 marks (including internal assessment)
Practical: 25 marks

Transportation problem and its mathematical formulation, northwest-corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem, transshipment problem

Network models, shortest-path problem, minimum spanning tree problem, maximum flow problem, minimum cost flow problem, project network, CPM and PERT

Practical
(Ideal Lab Practical Batch Size: 15-20 Students)
Use TORA/ Excel spreadsheet to solve transportation problem, assignment problem, shortest-path problem, minimum spanning tree problem, maximum flow problem, CPM and PERT calculations of exercises from [1].
Case 8.1: Shipping Wood to Market, and Case 8.3: Project Pickings from [2].

References:
[1] Hamdy A. Taha, Operations Research, An Introduction, Prentice-Hall, 9th Ed., 2010.
[2] F. S. Hillier and G. J. Lieberman, Introduction to Operations Research-concepts and cases 9th Ed., Tata McGraw Hill, 2010
[3] Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 4th Ed., John Wiley and Sons, India, 2010

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