SYLLABI AND SCHEME OF EXAMINATIONS FOR SKILL ENHANCEMENT COURSES FOR UNDER GRADUATE PROGRAMS (SINGLE MAJOR / MULTIDISCIPLINARY/ BACHELOR OF SCIENCE (MATHEMATICS) 4-YEAR PROGRAMS) OFFERED BY THE DEPARTMENT OF MATHEMATICS

(Based on Curriculum and Credit Framework for UG Programs under NEP)

WITH EFFECT FROM THE SESSION 2024-25

MAHARSHI DAYANAND UNIVERSITY ROHTAK (HARYANA)

SYLLABI AND SCHEME OF EXAMINATIONS FOR SKILL ENHANCEMENT COURSES FOR

UNDER GRADUATE SINGLE MAJOR/MULTIDISCIPLINARY PROGRAMS/ SINGLE MAJOR PROGRAM AFTER 2nd SEMESTER OF MULTIDISCIPLINARY PROGRAM

Skill Enhancement Course (SEC)	Nomenclature of Course	Course Code	Credits Distribution			Total Credits	Workload			Total Workload	Marks				Total Marks
			L	T	P		L	T	P		Theory		Practical		
											Internal	External	Internal	External	
SEMESTER 1 (2024-25)															
SEC 1 @ 3 credits	Mathematical Programming in C and Numerical Methods	24MAT401SE01	02	00	01	03	**2**	**0**	**2N**	**2+2N**	15	35	05	20	75
SEMESTER II (2024-25)															
SEC 2 @ 3 credits	Numerical Analysis	24MAT402SE01	02	00	01	03	**2**	**0**	**2N**	**2+2N**	15	35	05	20	75
SEMESTER 1II (2024-25)															
SEC 3 @ 3 credits	Operations Research Techniques	25MAT403SE01	02	00	01	03	**2**	**0**	**2N**	**2+2N**	15	35	05	20	75
SEMESTER VI (2024-25)															
SEC 4 @ 2 credits (offered only in case of Single Major Programme)	Vedic Mathematics	26MAT406SE01	02	00	01	03	**2**	**0**	**2N**	**2+2N**	15	35	05	20	75
SEMESTER VI1 (2024-25)															
SEC 5 @ 4 credits (if offered as an option)	Discrete Mathematics	24MAT407SE01	03	01	00	04	**3**	**1N**	**00**	**3+1N**	30	70	00	00	100
	Object Oriented Programming with C++	24MAT407SE02	2	0	2	4	2	0	4N	2+4N	15	35	15	35	100
SEMESTER VII1 (2024-25)															
SEC 6 @ 4 credits (if offered as an option)	Advanced Complex Analysis	24MAT408SE01	03	01	00	04	**3**	**1N**	**00**	**3+1N**	30	70	00	00	100
	Python	24MAT408SE03	2	0	2	4	2	0	4N	2+4N	15	35	15	35	100

N : Number of Groups in the Class

L: Lecture; T: Tutorial; P: Practical

Syllabi for SKILL ENHANCEMENT COURSES

Semester I

Session: 2024-25

Name of Program		**Program Code**	
Name of the Course	Mathematical Programming in C and Numerical Methods	**Course Code**	24MAT401SE01
Hours per Week	**04**	**Credits**	**03**
Maximum Marks	**75 (50 Theory + 25 Practical)**	**Time of Examinations**	**03 Hours**

Note:
Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory containing four short answer type questions from all sections. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each Section. All questions will carry equal marks.

Course Learning Outcomes (CLO):
CLO 1: Develop C programs and execute them.
CLO 2: Write the C code for a given algorithm.
CLO 3: Learn conditional statements, logical statements and their programs along with array implementation.
CLO 4: Apply numerical methods using C language.

Section - I

Programmer's model of a computer, Algorithms, Flow charts, Data types, Operators and expressions, Input / Output functions. Decisions control structure: Decision statements, Logical and conditional statements, Implementation of Loops, Switch Statement & Case control structures. Functions, Preprocessors and Arrays.

Section - II

Strings: Character Data Type, Standard String handling Functions, Arithmetic Operations on Characters. Structures: Definition, using Structures, use of Structures in Arrays and Arrays in Structures. Pointers: Pointers Data type, Pointers and Arrays, Pointers and Functions.

Section - III

Solution of Algebraic and Transcendental equations: Bisection method, Regula-Falsi method, Secant method, Newton-Raphson's method. Newton's iterative method for finding pth root of a number, Order of convergence of above methods.

Section - IV

Simultaneous linear algebraic equations: Gauss-elimination method, Gauss-Jordan method, Triangularization method (LU decomposition method). Crout's method, Cholesky Decomposition method. Iterative method, Jacobi's method, Gauss-Seidal's method, Relaxation method.

Part-B (Practical)

Max. Marks : 25{External (term-end exam) – 20}
(Internal – 5)
Time : 3 Hours

There will be a separate practical paper consisting of implementation of Linear Programming, studied in the theory paper **24MAT401SE01** (Part-A). There will be five questions in all, and the students must attempt any three questions. The question paper will set on the spot jointly by the internal and external examiners.
Distribution of Marks will be as follows:

Marks for Question Paper:	12
Marks for Practical Record Book:	05
Marks for Viva-Voce:	03
Total:	20

References:

1. B.W. Kernighan and D.M. Ritchie, The C Programming Language, 2nd Edition
2. V. Rajaraman, Programming in C, Prentice Hall of India, 1994
3. Byron S. Gottfried, Theory and Problems of Programming with C, Tata McGraw-Hill Publishing Co. Ltd., 1998
4. Babu Ram, Numerical Methods, Pearson Publication.
5. M.K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical Method, Problems and Solutions, New Age International (P) Ltd., 1996

6. M.K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical Method for Scientific and Engineering Computation, New Age International (P) Ltd., 1999
7. E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill Publishing Co. Ltd.

Semester II

Session: 2024-25

Name of Program		**Program Code**	
Name of the Course	**Numerical Analysis**	**Course Code**	**24MAT402SE01**
Hours per Week	**04**	**Credits**	**03**
Maximum Marks	**75 (50 Theory + 25 Practical)**	**Time of Examinations**	**03 Hours**

Note:
Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory containing four short answer type questions from all sections. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each Section. All questions will carry equal marks.

Course Learning Outcomes (CLO):

CLO 1 Learn about interpolation with equal and unequal intervals.
CLO 2 Apply forward, backward, central and divided difference formulae for interpolation.
CLO 3 Apply standard probability distributions to the concerned problems.
CLO 4 Understand the method of numerical differentiation and various methods for finding solution of eigen value problems..
CLO 5 Know how to solve integration and ordinary differential equation using numerical data

Section - I

Finite Differences operators and their relations. Finding the missing terms and effect of error in a difference tabular values, Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formulae. Interpolation with unequal intervals: Newton's divided difference, Lagrange's Interpolation formulae, Hermite Formula.

Section - II

Central Differences: Gauss forward and Gauss's backward interpolation formulae, Sterling, Bessel Formula. Numerical Differentiation: Derivative of a function using interpolation formulae.
Eigen Value Problems: Power method, Jacobi's method, Given's method, House-Holder's method, QR method, Lanczos method.

Section - III

Numerical Integration: Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's one- third and three-eighth rule, Chebychev formula, Gauss Quadrature formula.

Section - IV

Numerical solution of ordinary differential equations: Single step methods-Picard's method. Taylor's series method, Euler's method, Runge-Kutta Methods. Multiple step methods; Predictor-corrector method, Modified Euler's method, Milne-Simpson's method.

Part-B (Practical)

Max. Marks : 25{External (term-end exam) – 20}
(Internal – 5)
Time : 3 Hours

There will be a separate practical paper consisting of implementation of Linear Programming, studied in the theory paper **24MAT402SE01** (Part-A). There will be five questions in all, and the students must attempt any three questions. The question paper will set on the spot jointly by the internal and external examiners.
Distribution of Marks will be as follows:

Marks for Question Paper:	12
Marks for Practical Record Book:	05
Marks for Viva-Voce:	03
Total:	20

References:

1. Babu Ram, Numerical Methods: Pearson Publication.
2. R.S. Gupta, Elements of Numerical Analysis, Macmillan's India 2010.
3. M. K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Method, Problems and Solutions, New Age International (P) Ltd., 1996
4. M. K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Method for Scientific and Engineering Computation, New Age International (P) Ltd., 1999
5. C. E. Froberg, Introduction to Numerical Analysis (2nd Edition).
6. Melvin J. Maaron, Numerical Analysis-A Practical Approach, Macmillan Publishing Co., Inc., New York
7. R.Y. Rubnistein, Simulation and the Monte Carlo Methods, John Wiley, 1981