B.P.S.MAHILA VISHWAVIDYALAYA KHANPUR KALAN
(SONEPAT) HARYANA - 131305

SCHEME OF STUDIES & EXAMINATIONS

M.Sc. in Mathematics (Two Year Course)

Semester – I
Effective from Session 2016-2017(With CBCS)

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam.	Credit
		L	T	P	Internal Marks	External Marks	Total		
MAL- 501	Algebra	5	0	0	20	80	100	3 Hours	5
MAL- 503	Real Analysis	5	0	0	20	80	100	3 Hours	5
MAL-505	Mechanics	5	0	0	20	80	100	3 Hours	5
MA L-507	Ordinary Differential Equations-I	5	0	0	20	80	100	3 Hours	5
MAL- 509	Programming in C	3	0	0	20	80	100	3 Hours	3
MAP-511	Computing Lab	0	0	4	20	80	100	3 Hours	2
Total		**23**	**0**	**4**	**120**	**480**	**600**		**25**

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19.

B.P.S.MAHILA VISHWAVIDYALAYA KHANPUR KALAN
(SONEPAT) HARYANA - 131305

SCHEME OF STUDIES & EXAMINATIONS

M.Sc. in Mathematics (Two Year Course)

Semester – II
Effective from Session 2016-2017(With CBCS)

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam	Credit
		L	T	P	Interna Marks	External Marks	Total		
MAL- 502	Abstract Algebra	5	0	0	20	80	100	3 Hours	5
MAL- 504	Complex Analysis-1	5	0	0	20	80	100	3 Hours	5
MAL -506	Mathematical Statisti	5	0	0	20	80	100	3 Hours	5
MAL -508	Ordinary Differential Equations-II	5	0	0	20	80	100	3 Hours	5
MAL- 510	Methods of Applied Mathematics	5	0	0	20	80	100	3 Hours	5
MAP -512	MATLAB	0	0	6	20	80	100	3Hours	3
Total		**25**	**0**	**6**	**120**	**480**	**600**		**28**

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19.

B.P.S.MAHILA VISHWAVIDYALAYA KHANPUR KALAN
(SONEPAT) HARYANA - 131305

SCHEME OF STUDIES & EXAMINATIONS

M.Sc. in Mathematics (Two Year Course)

Semester – III

Effective from Session 2016-2017(With CBCS)

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam	Credit
		L	T	P	Internal Marks	External Marks	Total		
MAL- 601	Measure &Integration Theory	5	0	0	20	80	100	3 Hours	5
MAL- 603	Topology	5	0	0	20	80	100	3 Hours	5
MAL -605	Complex Analysis-II	5	0	0	20	80	100	3 Hours	5
Open Elective(to be chosen from the list of electives provided by the University) CBCS Paper		4	0	0	20	80	100	3 Hours	4
	Elective-I	5	0	0	20	80	100	3 Hours	5
	Elective-II	5	0	0	20	80	100	3 Hours	5
MAP-617	LATEX (Lab)	0	0	6	20	80	100	3Hours	3
Total		**29**	**0**	**6**	**140**	**560**	**700**		**32**

Electives:
(Students are required to take both the electives from the same Group- A)

Group-A
MAL- 607 Analytic Number Theory
MAL -609 Operations Research-I
MAL- 611 Mechanics of Solids-I
MAL- 613 Fluid Mechanics
MAL- 615 Advanced Discrete Mathematics

Note:
Electives can be offered subject to availability of requisite resources/ faculty in the department.

Chairperson
Deptt. of Basic & Applied Scie
BPS Mahila Vishwavidyala
Khanpur Kalan (Sonipat)

01/03/19.

B.P.S.MAHILA VISHWAVIDYALAYA KHANPUR KALAN
(SONEPAT) HARYANA - 131305

SCHEME OF STUDIES & EXAMINATIONS

M.Sc. in Mathematics (Two Year Course)

Semester – IV

Effective from Session 2016-2017(With CBCS)

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam	Credit
		L	T	P	Internal Marks	External Marks	Total		
MAL -602	Functional Analysis	5	0	0	20	80	100	3 Hours	5
MAL-604	Integral Equation	5	0	0	20	80	100	3 Hours	5
MAL -606	Differential Geometry	5	0	0	20	80	100	3 Hours	5
MAL- 608	Seminar	2	0	0	20	--------	20	----------	2
Open Elective(to be chosen from the list of electives provided by the University) CBCS Paper		4	0	0	20	80	100	3 Hours	4
	Elective-III	5	0	0	20	80	100	3 Hours	5
	Elective-IV	5	0	0	20	80	100	3 Hours	5
Total		**31**	**0**	**0**	**140**	**480**	**620**		**31**

Electives:
(Students are required to take both the electives from the group B)

Group B
MAL -610 Algebraic Coding Theory
MAL-612 Operations Research -II
MAL -614 Mechanics of Solids-II
MAL- 616 Advanced Fluid Mechanics
MAL- 618 Partial Differential Equations

Note:
Electives can be offered subject to availability of requisite resources/ faculty in the department.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19.

B.P.S.MAHILA VISHWAVIDYALAYA, KHANPUR KALAN, SONEPAT
Department of Basic and Applied Sciences
Master of Science (M.Sc.) in Mathematics
w. e. f. 2015-2016 (without CBCS)

Semester I

MAL- 501	Algebra	5 credits	5-0-0
MAL -503	Real Analysis	5 credits	5-0-0
MAL -505	Mechanics	5 credits	5-0-0
MAL -507	Ordinary Differential Equations-I	5 credits	5-0-0
MAL -509	Programming in C	3credits	3-0-0
MAP -511	Computing Lab	2 credits	0-0-4
	Total Credits	**25 Credits**	

Semester II

MAL- 502	Abstract Algebra	5 credits	5-0-0
MAL -504	Complex Analysis-I	5 credits	5-0-0
MAL -506	Mathematical Statistics	5 credits	5-0-0
MAL -508	Ordinary Differential Equations-II	5 credits	5-0-0
MAL -510	Methods of Applied Mathematics	5 credits	5-0-0
MAP -512	MATLAB	2 credits	0-0-4
	Total Credits	**27Credits**	

Semester III

MAL-601	Measure &Integration Theory	5credits	5-0-0
MAL-603	Topology	5 credits	5-0-0
MAL-605	Complex Analysis-II	5credits	5-0-0
	Elective-I	5 credits	5-0-0
	Elective-2	5 credits	5-0-0
MAP-617	LATEX (Lab)	2credits	0-0-4
	Total Credits	**27 Credits**	

Electives:
(Students are required to take both the electives from the same Group- A)
Group-A

MAL- 607	Analytic Number Theory
MAL-609	Operations Research-I
MAL- 611	Mechanics of Solids-I
MAL- 613	Fluid Mechanics
MAL-615	Advanced Discrete Mathematics

Note: Electives can be offered subject to availability of requisite resources/ faculty in the Department

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

Semester IV

MAL- 602	Functional Analysis	5 credits	5-0-0
MAL-604	Integral Equations	5 credits	5-0-0
MAL-606	Differential Geometry	5credits	5-0-0
MAL-608	Seminar	2 credits	2-0-0
	Elective-3	5Credits	5-0-0
	Elective-4	5 credits	5-0-0
	Total Credits	27 credits	

Electives:
(Students are required to take both the electives from the group B)
Group B

MAL- 610	Algebraic Coding Theory
MAL-612	Operations Research -II
MAL-614	Mechanics of Solids-II
MAL-616	Advanced Fluid Mechanics
MAL-618	Partial Differential Equation

Note: Electives can be offered subject to availability of requisite resources/ faculty in the department.

Chairperson
Deptt. of Basic & Applied Sci
BPS Mahila Vishwavid
Khanpur Kalan (Sor

01/03/19

B.P.S.MAHILA VISHWAVIDYALAYA KHANPUR KALAN
(SONEPAT) HARYANA - 131305

SCHEME OF STUDIES & EXAMINATIONS

M.Sc. in Mathematics (Two Year Course)

Semester – I
Effective from Session 2015-2016 (without CBCS)

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam	Credit
		L	T	P	Internal Marks	External Marks	Total		
MAL- 501	Algebra	5	0	0	20	80	100	3 Hours	5
MAL- 503	Real Analysis	5	0	0	20	80	100	3 Hours	5
MAL-505	Mechanics	5	0	0	20	80	100	3 Hours	5
MA L-507	Ordinary Differential Equations-I	5	0	0	20	80	100	3 Hours	5
MAL- 509	Programming in C	3	0	0	20	80	100	3 Hours	3
MAP-511	Computing Lab	0	0	4	20	80	100	3 Hours	2
Total		23	0	4	120	480	600		25

Semester – II
Effective from Session 2015-2016 (without CBCS)

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam	Credit
		L	T	P	Interna Marks	Externa Marks	Total		
MAL- 502	Abstract Algebra	5	0	0	20	80	100	3 Hours	5
MAL- 504	Complex Analysis-1	5	0	0	20	80	100	3 Hours	5
MAL -506	Mathematical Statisti	5	0	0	20	80	100	3 Hours	5
MAL -508	Ordinary Differential Equations-II	5	0	0	20	80	100	3 Hours	5
MAL- 510	Methods Of Applied Mathematics	5	0	0	20	80	100	3 Hours	5
MAP -512	MATLAB	0	0	6	20	80	100	3Hours	3
Total		25	0	6	120	480	600		28

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19.

M.Sc. in Mathematics (Two Year Course)

Semester – III

Effective from Session 2015-2016 (without CBCS)

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam	Credit
		L	T	P	Interna Marks	Externa Marks	Total		
MAL- 601	Measure &Integration Theory	5	0	0	20	80	100	3 Hours	5
MAL- 603	Topology	5	0	0	20	80	100	3 Hours	5
MAL -605	Complex Analysis-II	5	0	0	20	80	100	3 Hours	5
	Elective-I	5	0	0	20	80	100	3 Hours	5
	Elective-II	5	0	0	20	80	100	3Hours	3
MAP-617	LATEX (Lab)	0	0	6	20	80	100		28
	Total	25	0	6	120	480	600		

Electives:
(Students are required to take both the electives from the same Group- A)

Group-A

MAL- 607	Analytic Number Theory
MAL -609	Operations Research-I
MAL- 611	Mechanics of Solids-I
MAL- 613	Fluid Mechanics
MAL- 615	Advanced Discrete Mathematics

Note:
Electives can be offered subject to availability of requisite resources/ faculty in the department.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

M.Sc. in Mathematics (Two Year Course)

Semester – IV

Effective from Session 2015-2016 (without CBCS)

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam	Credit
		L	T	P	Interna Marks	Externa Marks	Total		
MAL -602	Functional Analysis	5	0	0	20	80	100	3 Hours	5
MAL-604	Integral Equation	5	0	0	20	80	100	3 Hours	5
MAL -606	Differential Geometry	5	0	0	20	80	100	3 Hours	5
MAL- 608	Seminar	2	0	0	20	--------	20	----------	2
	Elective-III	5	0	0	20	80	100	3 Hours	5
	Elective-IV	5	0	0	20	80	100	3 Hours	5
Total		27	0	0	120	400	520		27

Electives:
(Students are required to take both the electives from the group B)

Group B

MAL -610 Algebraic Coding Theory
MAL-612 Operations Research -II
MAL -614 Mechanics of Solids-II
MAL- 616 Advanced Fluid Mechanics
MAL- 618 Partial Differential Equations

Note:

Electives can be offered subject to availability of requisite resources/ faculty in the department.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

Syllabi and Course Scheme w.e.f. 2015-2016
M.Sc. (Mathematics) 1st Semester
MAL - 501: ALGEBRA

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note: The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Zassenhaus's lemma, Normal, Subnormal series, Scheiers theorem, Composition Series Jordan-Holder theorem (Abelian and Non-Abelian groups), Commutators and their properties, Hall-Witt identity, three subgroup lemma of P. Hall.

Unit-II

Nilpotent groups and their class of nilpotency, Upper and lower central series and their properties, Invariant (normal) and chief series, Solvable groups and derived series.

Unit-III

Field theory, Extension of Fields, Algebraic and transcendental extensions, Prime fields, splitting fields,normal extensions, Separable and inseparable extensions,Algebrically closed fields,perfect fields.

Unit-IV

Finite fields,Automorphisms of Extensions, fixed fields, Galois extension, Fundamental theorem of Galois Theory, Solutions of polynomial equations by radicals, Insolvability of the general polynomial of degree 5 by radicals.

References:

1. I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. P.B. Bhattacharya, S.K. Jain and S.R. Nag Paul, Basic Abstract Algebra (2nd Edition), Cambridge University Press, Indian Edition, 1997.
3. M. Artin, Algebra, Prentice-Hall of India, 1991.
4. I.S. Luther and I.B.S. Passi, Algebra, Vol. I-Groups, Vol.II-Rings, Narosa Publishing House (Vol. I-1996, Vol. II-1999).
5. David S. Dummit and Richard M Foote, Abstract Algebra, Third Edition, John Wiley & Sons,Inc.USA

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAL -503: REAL ANALYSIS

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -I

Sequences and series of functions, point-wise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel's and Dirichlet's tests for uniform convergence, uniform convergence and continuity, uniform convergence and Riemann-Stieltjes integration, uniform convergence and differentiation. Weierstrass approximation theorem,power series,uniqueness theorem for power series,Abels theorem.

Unit-II

Functions of several variables,linear transformations,derivatives in an open subset if Rn,chain rule,partial derivatives,interchange of the order of differentiation,derivatives of higher orders,Explicit and Implicit function theorem, Taylor's theorem,jacobians,extreme problemswith constraints,Lagranges multiplier method.

Unit - III

Definition and existence of Riemann-Stieltjes integral, properties of the integral, integration and differentiation, the fundamental theorem of Calculus, integration of vector-valued functions, rectifiable curves.

Unit - IV

Set functions, intuitive idea of measure, elementary properties of measure, measurable sets and their fundamental properties, Lebesgue measure of sets of real numbers, algebra of measurable sets, Borel sets, equivalent formulation of measurable sets in terms of open, closed F_σ and G_δ sets, non measurable sets.

References:

1. W. Rudin, Principles of Mathematical Analysis (3rd edition) McGraw-Hill, Kogakusha, 1976, International Student edition.
2. T.M.Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International (P) Limited, New Delhi, 1986 (Reprint 2000).
4. H.L. Royden, Real Analysis, Macmillan Pub. Cop. Inc. 4th Edition, New York, 1993.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAL -505: MECHANICS

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note: The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Moments and products of Inertia, Theorems of parallel and perpendicular axes, principal axes, The momental ellipsoid, Equimomental systems, Coplanar distributions, Generalized coordinates, Holonomic and Non-holonomic systems, Scleronomic and Rheonomic sustems, Lagrange's equations for a holonomic system.

Unit-II

Lagrange's equations for a conservative and impulsive forces, Kinetic energy as quadratic function of velocities, Generalized potential, Energy equation for conservative fields. Hamilton's variables, Donkin's theorem, Hamilton canonical equations, Cyclic coordinates, Routh's equations, Poisson's Bracket, Poisson's Identity, Jacobi-Poisson Theorem.

Unit -III

Hamilton's Principle, Principle of least action, Poincare Cartan Integral invariant, Whittaker's equations. Jacobi's equations,Hamilton-Jacobi equation, Jacobi's theorem, Method of separation of variables , Lagrange Brackets, Condition of canonical character of a transformation in terms of Lagrange brackets and Poisson brackets, Invariance of Lagrange brackets and Poisson brackets under canonical transformations.

Unit -IV

Gravitation: Attraction and potential of rod, disc, spherical shells and sphere, Laplace and Poisson equations, Work done by self-attracting systems, Distributions for a given potential, Equipotential surfaces, Surface and solid harmonics, Surface density in terms of surface harmonics.

References:

1. F. Chorlton, A Text Book of Dynamics, CBS Publishers & Dist., New Delhi.
2. F.Gantmacher, Lectures in Analytic Mechanics, MIR Publishers, Moscow,1975.
3. Louis N. Hand and Janet D. Finch, Analytical Mechanics, Cambridge University Press,1998

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAL- 507: ORDINARY DIFFERENTIAL EQUATIONS-I

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Initial-value problem and the equivalent integral eqauation, ε-approximate solution, Cauchy-Euler construction of an ε-approximate solution, Equicontinuous family of functions, Ascoli-Arzela theorem, Cauchy-Peano existence theorem.

Uniqueness of solutions, Lipschitz condition, Picard-Lindelof theorem for local existence and uniqueness of solutions, solution of initial-value problems by Picard method,

Unit-II

Total differential Equations: Condition of Integrability, Methods of Solution, Gronwall's differential inequality, comparison theorems involving differential inequalities, zeros of solutions, Riccati's Equation, Pruffer transformation, Lagrange's identity and Green's Formula for second-order equation

Unit-III

Sturms separation and comparison theorems. Sturm-Liouville boundary-value problems, properties of eigen values and eigen functions. Separation variable method for heat and wave equation (one dimensional) and Laplace equation in (two dimensional) in Cartesian system.

Unit-IV

Introduction solution of linear differential equation of second order, complete solution in terms of known integral, Removal of the first derivative, transformation of the equation by changing the independent variable, method of variation of parameters and method of operational factors.

References:

1. E.A. Coddington and N. Levinson,Theory of Ordinary Differential Equations, Mc Graw Hill, NY, 1955.
2. G. Birkhoff and G.C. Rota, Ordinary Differential Equations, John Wiley and Sons Inc..NY, 1978.
3. S.L. Ross, Differential Equations, John Wiley and Sons Inc., NY, 1984.
4. W.E. Boyce and R.C. Diprima, Elementary Differential Eqluations and Boundary Value Problems, John Wiley and sons Inc., NY, 1986.
5. Philip Hartman, Ordinary Differential Equations, John Wiley & Sons, NY 1964.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAL- 509: PROGRAMMING IN C

L	T	P
5	0	0 (5 Credits)

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -I

An overview of programming, Programming languages, C Character Set, Constants Variables and Keywords, Types of C Constants, Rules for constructing Integer, Real and Character constants, Types of C Variables, C Instructions and their Type Declaration, Integer and Float Conversions.

Unary Plus and Minus operator, Binary Arithmetic Operators, Arithmetic Assignment Operators, Increment and Decrement Operators, Common Operator, Relational Operators, Logical Operators, Bit Manipulation Operators, Bitwise Assignment Operators, Cast Operator, Size of Operators Conditional Operator, Memory Operators, Hierarchy of Operators.

Unit -II

The if Statement, Multiple Statements within if, if-else statement, Nested if-else and use of Logical operators, Switch statement.

The while Loop, for loop, Nesting of Loops, The break Statement, The continue Statement, The do-while Loop, Switch statement and goto statement.

Unit -III

Arrays– Declaring an array, Arrays and Memory, Initializing arrays, Multidimensional arrays, Strings and it's in built functions.

Functions –The basics, declarations and calls, type of functions, Function call by Value and call by Reference, passing Arrays as Function Arguments, Recursion.

Unit -IV

Pointers – Pointer Arithmetic, Accessing Array elements through Pointers, Passing Pointers as Function arguments, Arrays of pointers, Pointers to pointers.Macros with Arguments, Macros versus function, File Inclusion.Structures, Accessing Structure Elements and storing Structure Elements, Array of Structure, Uses of Structure and Union.

Reference:

1. E. Balagurusamy, Programming in ANSI C, TATA Mc Graw Hill.
2. Gottfried Byrons , Programming in C, Schaum's Series.
3. Brain W. Kernighan & Dennis M. Ritchie, The C Programme Language 2nd Ed, ANSI Features) Prentice Hall 1989.
4. Peter A. Darnell and Phillip E. Margolis , C : A Software Engineering Approach, Narosa Publishing House (Springer International student Edition) 1993.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAP- 511: COMPUTING LAB

L	T	P		
0	0	6 (3 Credits)	Marks for External Exam	: 80
			Marks for Internal Exam	: 20
			Total	: 100
			Time	: 3 Hours

Practicals will be based on the Theory paper MAL - 509: Programming in C

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

2263
M-19

M.Sc. (Mathematics) 2nd Semester
MAL - 502: ABSTRACT ALGEBRA

L	T	P
5	0	0 (5 Credits)

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note: The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -1

Homomorphism (R,R,), opposite rings, Cyclic modules, Simple & Semi-simple modules, Schur's Lemma. Free modules, fundamental structure theorem for finitely generated abelian groups and its application to finitely generated abelian groups.

Unit-2

Noetherian and Artinian modules and rings Hilbert basis theorem, Wedderburn-Artin theorem. Uniform modules, primary modules and Noether-Lasker theorem.

Unit -3

Canonical Forms: Similarity of linear transformations, Invariant subspaces, Reduction to triangular forms, Nilpotent transformations, Index of nilpotency, Invariants of a nilpotent transformation.

Unit-4

The primary decomposition theorem, Jordan blocks and Jordan forms, rational canonical form, generalized Jordan form over any field.

References:

1. I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. P.B. Bhattacharya, S.K. Jain and S.R. Nag Paul, Basic Abstract Algebra (2nd Edition), Cambridge University Press, Indian Edition, 1997.
3. P.M. Cohn, Algebra, Vols. I, II & III, John Wiley & Sons, 1982, 1989, 1991.
4. N. Jacobson, Basic Algebra, Vols. I & II, W.H. Freeman, 1980.
5. I.S. Luther and I.B.S. Passi, Algebra, Vol. I-Groups, Vol.II-Rings, Narosa Publishing House, Vol. I-1996, Vol. II-1999.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan

01/03/19

2264
M-19.

MAL - 504: COMPLEX ANALYSIS-I

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -I

Cauchy Riemann equations, Necessary and sufficient conditions for a function to be analytic,Polar form of Cauchy Riemann equations, Harmonic function ,Construction of analytical function, Power series, Radius of convergence of power series, Sum function of power series,Cauchy Hadamard theorem.

Unit –II

Complex Integration, Cauchy-Goursat Theorem, Simply and Multiply connected domains, Cauchy's Integral formula, Cauchy's Integral formula for higher Order derivatives, Morera's theorem, Cauchy's inequality, Liouville's theorem, The fundamental theorem of Algebra, Maximum Modulus Principle, Schwarz Lemma, Poisson's integral formula.

Unit - III

Transformation,Jacobian Transformation, Conformal Transformation ,Some general transformations, Bilinear transformations and their properties and classification.

Unit -IV

Taylor's Series, Laurent's Series, Signularities, Meromorphic functions, Argument principle, Rouche's theorem,Calculus of residues, Cauchy's residue theorem,Mittag Leffler's expansion theorem.

References:

1. H.A. Priestly, Introduction to Complex Analysis, Clarendon Press, Oxford, 1990.
2. J.B. Conway, Functions of one Complex variable, Springer-Verlag, International Student-Edition, Narosa Publishing House, 1980.
3. L.V. Ahlfors, Complex Analysis, Mc Graw-Hill, 1979.
4. Mark J. Ablowitz and A.S. Fokas, Complex Variables: Introduction and Applications, Cambridge University Press, South Aisian Edition, 1998.
5. S. Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, 1997.
6. J.W. Brown and R.V. Churchill, Complex Variables and Applications, MC Graw Hill, 1996.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

2265
M-19

MAL - 506: MATHEMATICAL STATISTICS

L	T	P	
5	0	0	(5 Credits)

Marks for External Exam : 80
Marks for Internal Exam : 20
Total : 100
Time : 3 Hours

Note: The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -I

Sample spaces, random variables, Distribution and density distribution function, Marginal and conditional distribution, Mathematics expectation, Moments, moment generating function,cumulants, cumulants generating function, characteristic function,

Unit-II

Probability distributions: Binomial, Poisson, Geometric, Uniform and Exponential, distributions.(Detailed Theory)

Unit -III

Normal distribution, Gamma distribution, t, f, and Chi-square distribution as sampling distributions, Weak law of large numbers, Central limit theorem.

Unit -IV

Correlation: Karl Pearson coefficient of correlation, Rank correlation, Partial and multiple correlation and their Cofficients , Yules notations.
Regression: lines of regression, regression curves, regression coefficients and its properties, angle between two lines of regression, Plane of regression

References:

1. R.V.Hogg&A.T.Craig:Introduction to Mathematical Statistics,Amerind Pub.Co.Pvt.Ltd.New Delhi,1972
2. S.C. Gupta and V.K Kapoor, Fundamentals of Mathematical Statistics, S. Chand & Sons, Educational Pub., New Delhi
3. Schaum series outlines,Mathematical Statistics.

01/03/19.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

2266
M-19.

MAL - 508: ORDINARY DIFFERENTIAL EQUATIONS-II

L	T	P	
5	0	0(5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -I

Linear systems, fundamental set and fundamental matrix of a homogeneous system, Wronskian of a system. Method of variation of constants for a non-homogeneous system, reduction of the order of a homogeneous system, systems with constant coefficients, adjoint systems, periodic solutions, Floquet theory for periodic systems (Relevant topics from the book by Coddington and Levinson).

Unit -II

Nonlinear differential equations, plane autonomous systems and their critical points, classification of critical points-rotation points, foci, nodes, saddle points. Stability, asymptotical stability and unstability of critical points, almost linear systems, Perturbations, Simple Critical points, dependence on a parameter.

Unit -III

Liapunov function, Liapunov's method to determine stability for nonlinear systems, limit cycles, Bendixson non-existence theorem, Statement of Poincare-Bendixson theorem, index of a critical point (Relevant topics from the books of Birkhoff & Rota, and by Ross).

Unit -IV

Motivating problems of calculus of variations,shortest distance,minimum surface of revolution, Brachistocrone problem,isoperimetric problem, geodesics, Fundamental lemma of calculus of variations, Eulers equation for one dependent function and generalization to n dependent functions and to higher order derivatives,conditional extremum under geometric constraints and under integral constraints.(Relavant topics from the book Gelfand and Fomin)

References

1. E.A.Coodington and N. Levinson. Theory of Ordinary Differential Equations, McGraw Hill, NY, 1955.
2. G.Birkhoff and G.C.Rota, Ordinary Differential Equations, John Wiley and Sons , NY, 1978.
3. S.L. Ross. Differential Equations, John Wiley and Sons inc., NY, 1984.
4. J M Gelfand and Fomin ,S V ,Calculation of variations, Prentice hall,new Delhi,1963.
5. W.E. Boyce and R.C. Diprima, Elementary Differential Equations and Boundary Value Problems, John Wiley and Sons Inc., NY, 1986.
6. Philip Hartman, Ordinary Differential Equations, John Wiley & Sons, NY,1964.

Chairperson
Deptt. of Basic & Applied Sciences
Mahila Vishwavidyalaya

01/03/19

2267
M-19

MAL -510: METHODS OF APPLIED MATHEMATICS

L	T	P	
5	0	0	(5 Credits)

Marks for External Exam : 80
Marks for Internal Exam : 20
Total : 100
Time : 3 Hours

Note: The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -I

Fourier Transforms: Definition and properties, Fourier transform of some elementary functions, convolution theorem, Application of Fourier transforms to solve ordinary & partial differential equations.

Unit -II

Curvilinear Co-ordinates: Co-ordinate transformation, Orthogonal Co-ordinates, Grad, Div, Curl, Laplacian in Orthogonal Co-ordinates, Cylindrical and Spherical Co-ordinates, expressions for velocity and accelerations, ds, dv and ds^2 in orthogonal co-ordinates, Areas, Volumes and Surface areas in Cartesian, Cylindrical & Spherical co-ordinates, Contravariant and Co-variant components of a vector,Metric coefficients & Volume elements.

Unit -III

MellinTransforms:Elementary properties, Mellin Transforms of derivatives and integrals,Inversion and Convolution theorem,solution of some integral equation.

Unit-IV

Hankel Transforms: Elementary properties,Inversion theorem, Hankel Transforms of derivatives and some elementary function,relation between Fourier and Hankel transform.

References:

1. I.N Sneddon., The Use of Integral Transforms, McGraw Hill, 1972.
2. Murray and R.Spiegel, Vector Analysis, Schaum's Series.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAP - 512: MAT LAB

L	T	P		
0	0	6 (3 Credits)	Marks for External Exam	: 80
			Marks for Internal Exam	: 20
			Total	: 100
			Time	: 3 Hours

The objective of the course is to familiarize the students with the working of the MATLAB software

Programming assignments using MATLAB based on basic mathematical computations will be given to the students.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

M.Sc. (Mathematics) 3rd Semester
MAL -601: MEASURE AND INTEGRATION THEORY

L	T	P
5	0	0 (5 Credits)

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note: The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit – I

Measurable functions and their equivalent formulations, Properties of measurable functions. Approximation of measurable functions by sequences of simple functions, Measurable functions as nearly continuous functions, Egoroffs theorem, Lusin's theorem, Convergence in measure and F. Riesz theorem for convergence in measure, Almost uniform convergence.

Unit – II

Shortcomings of Riemann Integral. Lebesgue Integral of a bounded function over a set of finite measure and its properties, Lebesgue integral as a generalization of Riemann integral, Bounded convergence theorem, Lebesgue theorem regarding points of discontinuities of Riemann integrable functions,

Unit – III

Integral of non-negative functions, Fatou's Lemma, Monotone convergence theorem, General Lebesgue Integral, Lebesgue convergences theorem. Vitali's covering Lemma, Differentiation of monotonic functions,

Unit – IV

Functions of bounded variation and its representation as difference of monotonic functions.,Differentiation of indefinite integral. Fundamental Theorem of Calculus. Absolutely continuous functions and their properties.

References:

1. Walter Rudin, Principles of Mathematical Analysis (3rd edition) McGraw-Hill, Kogakusha, 1976, International Student edition.
2. T.M.Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International (P) Limited Published, New Delhi, 1986 (Reprint 2000)
4. H.L. Royden, Real Analysis, Macmillan Pub. Co. Inc. 4th Edition, New York, 1993.
5. Walter Rudin, Real and Complex Analysis, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1966

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19

MAL - 603: TOPOLOGY

L	T	P		
5	0	0 (5 Credits)	Marks for External Exam	: 80
			Marks for Internal Exam	: 20
			Total	: 100
			Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Definition and examples of topological spaces, Neighborhoods, Interior point and interior of a set , Closed set as a complement of an open set , Adherent point and limit point of a set, Closure of a set, Derived set, Properties of Closure operator, Boundary of a set , Dense subsets, Interior, Exterior and boundary operators.

Base and subbase for a topology, Neighbourhood system of a point and itsproperties, Base for Neighbourhood system Relative(Induced) topology, Alternative methods of defining a topology in terms of neighbourhood system and Kuratowski closure operator. Comparison of topologies on a set, Intersection and union of topologies on a set.

Unit-II

Continuous functions, Open and closed functions , Homeomorphism ,Connectedness and its characterization, Connected subsets and their properties, Continuity and connectedness, Connectedness spaces, Components, Locally connected spaces, Locally connected and product spaces.

Unit- III

First and Second Countable spaces and , Lindelof's theorm, Separable spaces, Countability and Separability, Separation axioms, T_0, T_1 and T_2 spaces their characterization and basic properties, Regular and normal spaces, Urysohn's Lemma and Tietze Extension theorem, T_3 and T_4 spaces, Complete regularity and Complete normality. $T_{3½}$ and T_5 spaces.

Unit - IV

Compact spaces and subsets, Compactness in terms of finite intersection property, Continuity and compact sets, Basic properties of compactness,Closedness of compact subset and a continuous map from a compact space into a Hausdorff space and its consequence. Sequentially and countably compact sets,Local compactness, Compactness and product space.

References:

1. W.J. Pervin, Foundations of General Topology, Academic Press Inc. New York, 1964.
2. J.L. Kelley, General Topology, Van Nostrand, Reinholkd Co., New York, 1995.
3. James R Munkres, Topology, A First Course, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
4. George F. Simmons, Introduction to Topology and Modem Analysis, Mc Graw-Hill, Book Company, 1963.
5. J. Dugundji, Topology, Allyn and Bacon, 1966 (Reprinted in India by Prentice Hall Of India Pvt. Ltd.).
6. K.D. Joshi, Introduction to general Topology, Wiley Eastern Ltd

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAL -605: COMPLEX ANALYSIS-II

L	T	P	
5	0	0	(5 Credits)

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -1

Spaces of Analytic functions, Hurwitz's theorem, Montel's theorem, Riemann mapping theorem, Weierstrass factorization theorem, Gamma function and its properties, Riemann Zeta function, Riemann's functional equation. Runge's theorem.

Unit -I1

Analytic Continuation, Uniqueness of direct analytic continuation, Uniqueness of analytic continuation along a curve, power series method of analytic continuation. Monodromy theorem and its consequences, Harmonic function on a disk, Harnack's inequality and theorem, Dirichlet problem. Green's functions.

Unit -III

Canoncial products, Jensen's formula. Poisson-jensen formula. Hadamard's three circles theorem. Order of an entire function. Exponent of Convergence. Borel's theorem. Hadamard's factorization theorem.

Unit- IV

The range of an analytic function. Bloch's theorem. The little Picard theorem. Schottky's theorem. Montel Caratheodory and the Great Picard theorem. Univalent functions. Bieberbach's conjecture (Statement only) and the "¼ theorem" (Statement only).

References:

1. H.A. Priestly, Introduction to Complex Analysis, Clarendon Press Oxford, 1990.
2. J.B. Conway, Functions of one Complex variable, Springer-Verlag, International Student-Edition, Narosa Publishing House, 1980.
3. L.V. Ahlfors, Complex Analysis, McGraw-Hill, 1979.
4. Mark J. Ablowitz and A.S. Fokas, Complex Variables: Introduction and Applications, Cambridge University Press, South Asian Edition, 1998.
5. S. Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, 1997.
6. J.W. Brown and R.V. Churchill, Complex variable and Applications, McGraw Hill.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAP – 617: LATEX (Lab)

L	T	P		
0	0	6 (3 Credits)	Marks for External Exam	: 80
			Marks for Internal Exam	: 20
			Total	: 100
			Time	: 3 Hours

The objective of the course is to familiarize the students with the working of LATEX software.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAL -607: ANALYTIC NUMBER THEORY (elective)

L T P
5 0 0 (5 Credits)

Marks of External Exam: 80
Marks of Internal Exam : 20
Total Marks :100
Time :3 Hours

Note:
The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

UNIT-I

Primes in certain arithmetical progressions. Fermat numbers and Mersenne numbers. Approximation of irrational numbers by rationals. Hurwitz's theorem, irrationality of e and π. System of linear congruences Chinese Remainder Theorem. Quadratic residues and non-residues. Legendre's Symbol. Gauss Lemma and its applications. Quadratic Law of Reciprocity jacobi's Symbol.

UNIT-II

Riemann Zeta Function $\xi(s)$ and its convergence. Application in prime numbers. $\xi(s)$ as Euler's product. Evaluation of $\xi(2)$ and $\xi(2k)$. Dirichlet series with simple properties. Dirichlet series as analytic function and its derivative. Eulers products. Introduction to modular forms.

UNIT-III

Euler's summation formula and some elementary asymptotic formula. Average order of the arithmetical functions $d(n)$, $\sigma_\alpha a(n)$, $\phi(n)$, $\mu(n)$ and $\Lambda(n)$. Partial sums of a Dirichlet product and their application to $\mu(n)$ and $\Lambda(n)$.

UNIT-IV

Chebyshev's functions $\Psi(x)$ and $\nu(x)$ and relation between $\nu(x)$ and $\pi(x)$. Shapiro's Tauberian theorem and its applications. Partial sums of the Mobius function. Selberg's asymptotic formula.

Refrences:

1. T.M. Apostol. Introduction to Analytic number theory (Narosa Publishing House 1980).
2. T.M. Apostol. Modular functions and Dirichlet series in Number Theory (Springer-Verlag 1976).
3. J.P. Serre. A Course in Arithmetic G.T.M. Vol.7 (Springer Verlag 1973).

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/03/19

MAL -609: OPERATIONS RESEARCH-I(elective)

L T P	Marks of External Exam: 80
5 0 0 (5 Credits)	Marks of Internal Exam : 20
	Total Marks :100
	Time :3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit – I

Definition and scope of operations research , operations research techniques, phases of operations research study ,formulating a mathematical model ,limitations of operations research.
Linear programming :mathematical formulation of L.L.P., graphical solution of linear programming problem with two decision variables , general linear programming problem.
Concept of convex sets , extreme points, hyper plane, basic feasible and optimal solutions.

Unit – II

Simplex algorithm , special problems associated with simplex algorithm viz: multiple solution , unbounded solution, degenerate solution. Application of linear programming technique in (i) textile industries , (ii) manufacturing industries (iii) sugar production (iv) agricultural production planning.
Dual Simplex method, Revised Simplex method.

Unit – III

Transportation Problems: definition, formulation and solution of transportation problems, least time transportation problem, application of transportation model in air lift operation. Assignment problem: definition of assignment model and its comparison with transportation model, formulation and solution of assignment model, shortest cyclic and acyclic route models.

Unit-IV

Job sequencing: problem of sequencing jobs, processing n jobs through two machines (Johnson's algorithm) , processing n jobs through three machines.
Replacement models: replacement of capital equipment, group replacement
Inventory models: ABC analysis , generalized inventory model, deterministic models (single item static model (EQQ)), probabilistic models.

References:

1. Fundamental of operation research by Ackoff, R.L and sasieni , M.W.
2. Operation research by Mustafi, C.K.
3. Operation research by Taha, H.A.
4. Operation research by S D Sharma ,Kanti Sawroop.
5. Linear programming by Hadley,G.

01/03/19

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

MAL -611: MECHANICS OF SOLIDS-I (elective)

L	T	P	
5	0	0 (5 Credits)	

Marks of External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -1

Cartesian Tensor : Coordinate transformation, Cartesian Tensor of different order, Sum or difference and product of two tensors. Contraction theorem, Quotient law, Symmetric & Skew-symmetric tensors, Kronecker tensor, alternate tensor and relation between them, Scalar invariant of second order tensor, Eigen values & vectors of a symmetric second order tensor, Gradient, divergence & curl of a tensor field.

Unit -I1

Analysis of Strain : Affine transformations. Infinitesimal affine deformation. Geometrical interpretation of the components of strain. Strain quadric of Cauchy. Principal strains and invariants. General infinitesimal deformation. Saint- Venant' s equations of Compatibility.

Unit-III

Analysis of Stress: Stress tensor. Equations of equilibrium. Transformation of coordinates. Stress quadric of Cauchy. Principal stress and invariants. Maximum normal and shear stresses.

Unit- IV

Equations of Elasticity: Generalised Hooke's law. Homogeneous isotropic media. Elastic moduli for isotropic media. Equilibrium and dynamic equations for an isotropic elastic solid. Strain energy function and its connection with Hooke's law. BeItrami-MicheII compatibility equations. Saint- Venant' s principle.

Reference:

1. I.S. Sokolnikoff, Mathematical Theory of Elasticity, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1977.
2. Shanti Narayan, Text Book of Cartesian Tensors, S. Chand & Co., 1950.
3. S. Timoshenko and N. Goodier, Theory of Elasticity, McGraw Hill, New York, 1970.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19

MAL- 613: FLUID MECHANICS (elective)

L	T	P	
5	0	0	(5 Credits)

Marks of External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Kinematics of fluid-Lagrangian and Eulerian methods, Stream lines, Path lines, Streak lines, Velocity potential, Irrotational and rotational motions. Vortex lines, Equation of Continuity. Lagrangian and Eulerian approach, Euler's equation of motion, Bernoulli's theorem, Kelvin circulation theorem, Vorticity equation, Energy equation for an incompressible flow.

Unit-II

Boundary conditions, Kinetic energy of liquid, Axially symmetric flows, Motion of a sphere through a liquid at rest at infinity, Liquid streaming past a fixed sphere, Equation of motion of a sphere, Sources, Sinks and doublets, Images in a rigid impermeable infinite plane and in impermeable spherical surfaces.

Unit-III

Two-dimensional irrotational motion produced by motion of circular, co-axial and elliptic cylinders in an infinite mass of liquid, Stream functions, Stokes stream functions, Complex velocity potential.

Unit- IV

Conformal mapping, Milne-Thomson Circle theorem, Blasius theorem, Vortex Motion and its elementary properties, Kelvin's proof of permanence, Motion due to rectilinear vortices.

Reference:

1. W.H. Besaint and A.S. Ramsey, A Treatise on Hydromechanics, Part II, CBS Publishers, Delhi, 1988.
2. F. Chorlton, Textbook of Fluid Dynamics, C.B.S. Publishers, Delhi, 1985.
3. S.W. Yuan, Foundations of Fluid Mechanics, Prentice Hall of India Private Limited, New Delhi, 1976.
4. M.E.O'Neil and F.Choriton, Ideal and Incompressible Fluid Dynamics, John Wiley & Sons.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/15

MAL- 615: ADVANCED DISCRETE MATHEMATICS (elective)

L T P	Marks for External exam	:80
5 0 0 (5 credits)	Marks for Internal exam	:20
	Total	:100
	Time	: 3hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit –I

Recurrence Relations, Explicit Formula for a Sequence, Solution of Recurrence Relations Homogeneous Recurrence Relations with Constant Coefficients, Particular Solution of a Difference Equation, Recursive Functions, Generating Functions, Convolution of Numeric Functions, Solution of Recurrence Relations by the Method of Generating Function.

Unit – II

The Pigeonhole Principle, Partially Ordered Sets, Hasse Diagram, Logics: Basic Logical Operations, Logical Equivalence Involving Tautologies and Contradictions, Conditional Propositions, Quantifiers, Lattices: Properties of Lattices, Lattices as Algebraic System, Lattice Isomorphism, Bounded, Complemented and Distributive Lattices.

Unit – III

Definitions and Basic Properties of Boolean Algebra, Representation Theorem, Boolean Expressions, Logic Gates and Circuits, Boolean Function, Method to find Truth Table of a Boolean Function , Karanugh map, Expressing Boolean Functions as Boolean Polynomials, Addition of Binary Digits, Half – Adder, Full Adder.

Unit – IV

Graphs: Basic concepts and types of Graphs, Paths and Circuits, Eulerian Circuits, Hamiltonian Circuits, Matrix Representation of Graphs, Planar Graphs, Trees: Definition, and Characterization of Trees Representation of Algebraic Expressions by Binary Trees, Spanning Tree of a Graph, Shortest Path Problem, Minimal Spanning Tree, Tree Searching.

References:

1.Discrete Mathematics by Koleman, Busby & Rose, Pearson's Publication

2.Discrete Mathematical Structures by C.L. Liu, Pearson's Publication

3.Discrete Mathematics by Babu Ram, Pearson's Education, 2011

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19

2271/M-19

M.Sc. (Mathematics) 4th Semester
MAL -602: FUNCTIONAL ANALYSIS

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Normed linear spaces, metric on normed linear spaces, Holder's and Minkowski's inequality, completeness of quotient spaces of normed linear spaces, Completeness of I_p, L^p, R^n, C^n and C[a,b]. Bounded linear transformation, Equivalent formulation of continuity, Spaces of bounded linear transformation, Continuous linear functional, conjugate spaces.

Unit-II

Fundamental Theorems, Hahn Banach extension theorem (Real and Complex form) Riesz representation theorem for bounded linear functional on L^p and C [a,b] and their consequences, Second Conjugate spaces, Reflexive spaces, uniform boundedness principle and its consequence, open mapping theorem and its application, projections, closed graph theorem Equivalent norms.

Unit-III

Compact operators and its relation with continuous operators, compactness of linear transformation on a finite dimensional space, properties of compact operators, compactness of the limit of the sequence of compact operators, Fixed point, Banach Contraction Principle and its application to solve Matrix equation, Differential Equations, Picard's Theorem and Picard-Lindeloff Theorem.

Unit-IV

Inner product spaces, Hilbert spaces Schwarz's inequality, Hilbert space as normed linear space, convex sets in Hilbert spaces. Projection theorem, orthonormal systems and Gram-Schmidt Orthogonalization Process, Bessel's inequality, Parseval's identity, Conjugate of a Hilbert space, Riesz representation theorem for continuous functional on a Hilbert space.

References:

1. E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons, New York, 1978.
2. A.E. Taylor, Introductin to Functional Analysis, John Wiley and Sons, New York, 1958.
3. K. Yosida, Functional Analysis, 3rd edition Springer Verlag, New York, 1971.
4. Walter Rudin, Functional Analysis, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1973.
5. A.H.Siddiqi, Khalil Ahmad, P. Manchanda, Intoduction to Functional Anaiysis with Applications, Anamaya Publishers, New Delhi.

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19

2272
M-19.

MAL -604: INTEGRAL EQUATIONS

L	T	P	
5	0	0	(5Credits)

Marks for External Exam :80
Marks of Internal Exam :20
Total Marks :100
Time :3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -I

Definitions of Integral Equations and their classification. Relation between integral and differential equations, Fredholm integral equations of second kind with separable kernels. Eigen Values and Eigen functions. Reduction to a system of algebraic equations. An approximate Method. Method of successive approximations. Iterative scheme. Condition of convergence and uniqueness of series solution. Resolvent kernel and its results. Fredholm theorems.

Unit-II

Solution of Volterra's integral equations by iterative scheme. Successive approximation. Resolvent kernel. Integral transform methods: Fourier transform, Laplace transform, Convolution integral, Application to Volterra integral equations with Convolution type kernels, Abel's equations.

Unit-III

Symmetric kernel. Complex Hilbert space. Orthonormal system of functions, Fundamental properties of eigen values and eigen functions for symmetric kernels. Expansion in eigen function and bilinear form, Hilbert Schmidt theorem, Solution of integral equations with symmetric kernels

Singular Integral Equations - Inversion formula for singular integral equation with kernel of type $(h(s) - h(t) - a, 0< a <1)$.

Unit-IV

Dirac Delta Function. Green's function approach to reduce boundary value problems of a self-adjoint differential equation with homogeneous boundary conditions to integral equation forms. Auxiliary problem satisfied by Green's function. Modified Green's function.

Reference:

1. R.P. Kanwal, Linear Integral Equation. Theory and Techniques, Academic Press, New York, 1971.
2. S.G. Mikhlin, Linear Integral Equations (translated from Russian), Hindustan Book Agency, 1960.
3. Abdul J. Jerri, Introduction to Integral Equations with Applications.
4. Hildebrand. F.B - Method of Applied Mathematics

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19.

2273
M-19

MAL -606: DIFFERENTIAL GEOMETRY

L	T	P		
5	0	0 (5 Credits)	Marks for External Exam	: 80
			Marks for Internal Exam	: 20
			Total	: 100
			Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Curves with torsion: Tangent, Principal Normal, Curvature, Binormal, Torsion, Serret Frenet formulae, Locus of centre of spherical Curvature.

Unit-II

Envelopes: Surfaces, Tangent plane, Envelope, Characteristics, Edge of regression.

Unit-III

Curvilinear Co-ordinates: First order magnitude, Directions on a surface, Second order magnitudes, Derivative of unit normal, Principal directions and curvatures.

Unit-IV

Geodesics: Geodesics property, Equations of geodesics, Torsion of a geodesics.

References:

1. C.E., Weatherburn, Differential Geometry of Three Dimensions.
2. Differential Geometry by Schaums Series

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19

MAL- 608: SEMINAR

L	T	P	
2	0	0 (2 Credits)	Marks for Internal Exam : 20 Total : 20

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19.

2274
M-19.

MAL 610: ALGEBRAIC CODING THEORY (elective)

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit – 1

Block codes. Minimum distance of a code. Decoding principle of maximum likelihood. Binary error detecting and error correcting codes. Group codes. Minimum distance of a group code (m, m+1) parity check. Double and triple repition codes. Matrix codes. Generator and parity check matrices. Dual codes. Polynomial codes. Exponent of a polynomial over the binary field. Binary representation of a number. Hamming codes. Minimum distance of a Hamming code. (Chapter 1,2,3 of the book given at Sr. No.1).

Unit – II

Finite fields. Construction of finite fields. Primitive element of a finite field. Irreducibility of polynomials over finite fields. Irreducible polynomials over finite fields. Primitive polynomials over finite fields. Automorphism group of GF(qn). Normal basis of GF (qn). The number of irreducible polynomials over a finite field. The order of an irreducible polynomial. Generator polynomial of a Bose- Chaudhri- Hocqhenghem codes (BCH codes) construction of BCH codes over finite field. (Chapter 4 of the book given at Sr. No. 1 and Section 7.1 to 7.3 of the book given at Sr. No.2)

Unit – III

Linear codes. Generator matrices of linear codes. Equivalent codes and permutation matrices. Relation between generator and parity-check matrix of linear codes over a finite field. Dual code of a linear code. Self Dual codes. Weight distribution of a linear code. Weight enumerator of a linear code. Hadamard transform. Macwilliams identity for binary linear codes. Maximum distance separable codes. (MDS codes). Examples for MDS codes. Characterization of MDS codes in terms of generator and parity check matrices. Dual code of a MDS code. Reed Solomon codes. (Chapter 5&9 of the book at Sr. No. 1).

Unit – IV

Hadamard matrices. Existence of a Hadamard codes from Hadamard matrices cyclic codes. Generator polynomial of a cyclic code. Check polynomial of a cyclic code. Equivalent code & dual code of a cyclic code. Idempotent generator of a cyclic code. Hamming and BCH codes as cyclic codes. Perfect codes. The Gilbert-varsha-move and Plotkin bounds. Self dual binary cyclic codes. (Chapter 6&11 of the book given at Sr. No.1).

Refrences:

1. L.R. Vermani: Elements of Algebraic coding theory (Chapman and Hall Mathematics)
2. Steven Roman: Coding and information Theory (Springer Verlag)

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19.

MAL 612: OPERATIONS RESEARCH-II (elective)

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

PERT and CPM: project management through PERT and CPM , path , probability of meeting the scheduled dates , determination of critical path , float analysis.
Sensitivity analysis : changes in the requirement and cost vectors.

Unit-II

Game theory :optimal solution of two- person zero-sum games with mixed saratégies, graphical solution of (m x n) and(m x 2) games, solution of (m x n) games by linear programming.

Unit-III

Queuing theory : basic structure of queuing model ,role of exponential distribution queuing models based on pure birth and death processes , study state solution of M/M/1, M/M/C models with limited and unlimited capacity and M/M/C/N , M/M/ models .

Unit-IV

Networking models: terminology of networks and network construction. Minimal spanning tree problem, the shortest path problem , analysis of a project through network diagram .
Simulation: formulation and implementation of simulation model, generating random numbers, generating random observation from a probability distribution , variance reducing techniques.

References

1. Fundamental of operation research by Ackoff, R.L and sasieni , M.W.
2. Operation research by Mustafi, C.K.
3. Operation research by Taha, H.A.
4. Operation research by Kanti Sawroop.
5. Linear programming by Hadley,G.
6. Stocastic Processes by Medhi,J

01/3/17

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

2275
11-19.

MAL 614: MECHANICS OF SOLIDS-II (elective)

L	T	P		
5	0	0 (5 Credits)	Marks for External Exam	: 80
			Marks for Internal Exam	: 20
			Total	: 100
			Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Two-dimensional Problems: Plane stress. Generalized plane stress. Airy stress function. General solution of Biharmonic equation. Stresses and displacements in terms of complex potentials. The structure of functions of $\phi(z)$ and $\psi(z)$. First and second boundary value problems in plane elasticity, Thick-walled tube under external and internal pressures.

Unit-II

Viscoelasticity: Spring & Dashpot, Maxwell & Kelvin Models, Three parameter solid, Correspondence principle & its application to the Deformation of a viscoelastic Thick-walled tube in Plane strain.

Unit-III

Torsion:Torsion of cylindrical bars. Tortional rigidity. Torsion and stress functions. Lines of shearing stress. Simple problems related to circle, ellipse and equilateral triangle.

Waves: Propagation of waves in an isotropic elastic solid medium. Waves of dilatation and distortion. Plane waves. Elastic surface waves such as Rayleigh and Love waves.

Unit-IV

Variational methods - Theorems of minimum potential energy. Theorems of minimum complementary energy. Reciprocal theorem of Betti and Rayleigh. Deflection of elastic string, central line of a beam and elastic membrane. Solution of Euler's equation by Ritz, Galerkin and Kantorovich methods.

References:

1. I.S. Sokolnikoff, Mathematical Theory of Elasticity, Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Y.C. Fung, Foundations of Solid Mechanics, Prentice Hall, New Delhi.
3. S. Timoshenko and N. Goodier, Theory of Elasticity, McGraw Hill, New York.
4. W. Flugge, Viscoelasticity, Springer Verl

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

11/3/19

MAL-616: ADVANCED FLUID MECHANICS (elective)

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit-I

Stress components in a real fluid, Relations between rectangular components of stress, Connection between stresses and gradients of velocity. Navier-Stoke's equations of motion. Exact Solution of Navier-Stoke's equations of motion- Couette flows and Generalized Couette flow between two parallel plates, Plane Poiseuille flow, Hagen Poiseuille flow,Flow through tubes of uniform cross section in form of circle, annulus, ellipse and equilateral triangle under constant pressure gradient. Unsteady flow over a flat plate.

Unit-II

Dynamical similarity: Buckingham π-theorem. Reynolds number, Eckert Number, Froude Number, Application of pi- theorem to viscous and compressible fluid.

Unit-III

Boundry Layer Flow: Prandtl's boundary layer. Boundary layer equations in two-dimensions. Blasius solution. Boundary layer thickness. Displacement thickness. Karman integral equations. Separation of boundary layer flow.

Unit-IV

Wave motion in a gas: Speed of Sound, Equation of motion of a gas, Subsonic, Sonic and supersonic flows of a gas, Isentropic gas flows, Flow through a nozzle.

References:

1. F. Chorlton, Textbook of Fluid Dynamics, C.B.S. Publishers, Delhi, 1985.
2. H. Schlichting, Boundary Layer Theory, McGraw Hill Book Company, New York, 1979.
3. A.D. Young, Boundary Layers, AIAA Education Series, Washington DC, 1989.
4. S.W. Yuan, Foundations of Fluid Mechanics, Prentice Hall of India Private Limited, New Delhi, 1976

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19

MAL- 618: PARTIAL DIFFERENTIAL EQUATION (elective)

L	T	P	
5	0	0 (5 Credits)	

Marks for External Exam	: 80
Marks for Internal Exam	: 20
Total	: 100
Time	: 3 Hours

Note:

The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit -I

Solution of Partial Differential Equation. Transport equation-initial value problem, Non homogeneous equation,Laplace equation-fundamental solution, Mean value formulas, Properties of harmonic functions, Green function, Energy methods

Unit -II

Heat equation-fundamental solution, solution of initial value problems,non homogeneous equations,Mean value formula.Wave Equation-solution by spherical means, non homogeneous equations, Energy methods

Unit -III

Nonlinear first order PDE- complete integrals, Envelopes, Characteristics, Hamilton Jacobi equations, Hamilton's ODE, Hopf-Lax formula, Weak solutions, Uniqueness.

Unit -IV

Representation of Solutions:Separation of variables, Similarity solutions (Plain & Traveling waves solutions, Similarity under scaling), Fourier & Laplace transform,Hopf-Cole,Hodograph & Legendere transform, Potential functions.

References:

1. L.C. Evans, Partial Differential Equations, Graduate studies in mathematics, Volume-19, AMS, 1998.
2. I.N. Sneddon, Elements of Partial Differential Equations, McGraw Hill international
3. An Introduction to Partial Differential Equation Yehuda Pinchover and Jacob Rubinstein,CAMBRIDGE University press 2005

Chairperson
Deptt. of Basic & Applied Sciences
BPS Mahila Vishwavidyalaya
Khanpur Kalan (Sonipat)

01/3/19.