

MANIPAL UNIVERSITY JAIPUR
Department of Chemistry
Attendance-Board of studies (07.07.2017)

S. No	Name	Designation	Address	Chairperson/ Members	Signatures
1.	Dr. Babita Malik	Head & Professor	Department of Chemistry, MUJ	Chairman	<i>Babita</i>
2.	Prof. Lalita Ledwani	Professor	Department of Chemistry, MUJ	Member	<i>Lalita</i>
3.	Dr. Tanmoy Chakraborty	Associate Professor	Department of Chemistry, MUJ	Member	<i>Tanmoy</i>
4.	Dr. Rahul Srivastava	Associate Professor	Department of Chemistry, MUJ	Member	<i>Rahul Srivastava</i>
5.	Prof. V.S. Kulhar	Professor	Department of Physics, MUJ	Nominated Member from other Department	
6.	Prof. R.T. Pardasani	Dean	School of Chemical Sciences and Pharmacy, Central University of Rajasthan, Bandarsindri, Rajasthan	External Expert Member	Recommendation received through Mail (attached)
7.	Prof. Vandana Suhag	Registrar, MUJ	Manipal University Jaipur	Ex officio Member	<i>Vandana Suhag</i>



		The above will be implemented on pro-rata basis.	
19 AC (D-2) FACULTY OF ENGINEERING			
19 AC (D-2-1)	Modifications in Syllabi of III & IV Semester B Tech (AE)	The Council approved the modification in revamped syllabi of following two courses of 2 nd year B Tech Programme (Automobile Engineering): a) AU1306 Theory of Automotive Engines (III Semester) b) AU1407 Automotive Chassis Systems (IV Semester) This will be effective for the students admitted in 2016-17 onwards.	Implemented
19 AC (D-2-2)	Modifications in Scheme & Syllabi of V, VI & VII Semester B Tech (AE):	The Council approved the modifications in revamped scheme & syllabi of V, VI & VII Semester of B Tech Programme (Automobile Engineering). This will be effective for the students admitted in 2015-16 onwards.	Implemented
19 AC (D-3) FACULTY OF SCIENCE			
19 AC (D-3-1)	Revised Syllabus of Environment Studies for Non-Engineering Programmes	In view of module curriculum prescribed by the UGC, the Council approved the revised syllabus of Environment Studies for Non - Engineering programmes. This will be Implemented from Academic Year 2017-18 onwards.	Implemented
19 AC (D-4) FACULTY OF MANAGEMENT & COMMERCE			



19AC (C-26) Internal Quality Assurance Cell

19AC (C-27) UGC-NET Examination

19AC (D) DISCUSSION & DECISION ITEMS

19AC (D-1) UNIVERSITY AGENDA

19AC (D-1-1) Introduction of New Programme

19AC (D-1-2) Late Fee for Academic Registration

19AC (D-1-3) Accreditation of the University

19AC (D-1-4) Implementation of Environmental Studies as compulsory Course in UG Programmes

19AC (D-1-5) Online Platform for Teaching Learning Process

19AC (D-2) FACULTY OF ENGINEERING

19AC (D-2-1) Modifications in Syllabi of 3rd & 4th Semester BTech (AE)

19AC (D-2-2) Modifications in Scheme & Syllabi of 5th, 6th & 7th Semester B Tech (AE)

19AC (D-3) FACULTY OF SCIENCE

19AC (D-3-1) Revised Syllabus of Environment Studies for Non-Engineering Programmes

19AC (D-4) FACULTY OF MANAGEMENT & COMMERCE

19AC (D-4-1) Syllabus of M.Com (Financial Analysis) Programme

19AC (D-4-2) Introduction of Open Elective Course under School of Business & Commerce

19AC (D-4-3) Introduction of Business Research Methodology

19 AC (D-5) FACULTY OF ARTS & LAW

19 AC (D-5-1) Scheme of BA (Hons) Economics Programme

19 AC (D-6) FACULTY OF DESIGN

19 AC (D-6-1) Scheme and Syllabus of M Plan (Urban Planning)

19 AC (D-6-2) Open Elective Courses under School Planning & Design

19AC (E) ANY OTHER MATTER WITH THE PERMISSION OF THE CHAIR

Syllabus of Environmental Science CY1120

Syllabus 2016	Revised in 2017
<p>Multidisciplinary Nature of Environmental Studies; Natural resources (Renewable & Non Renewable Resources): Water Resources, Energy Resources, Forest Resources, Land Resources; Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Women and Child Welfare, Role of Information Technology in Environment; Biodiversity and its conservation: Value and Threats to biodiversity conservation, <i>In-situ</i> and <i>Ex-situ</i> conservation; Environmental pollution and control: Air pollution, ill effects of fireworks, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear Hazards; Social Issues and Environment; Climate Change, Global Warming, acid rain, ozone layer depletion, Waste land reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act;; Field Work.</p>	<p>Introduction to Environmental Studies; Multidisciplinary Nature of Environmental Studies, Scope and importance, concept of sustainability and sustainable development; Ecosystems; concept, structure and function, energy flow in an ecosystem, food chain, food webs and ecological succession, Forest, Grassland, Desert and Aquatic (Ponds, Streams, Lakes, River, Oceans, Estuaries) ecosystem; Natural Resources (Renewable & Non Renewable Resources); Land Resources and land use change, Land degradation, soil erosion and desertification; Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies; Biodiversity and Conservation; Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, man---wildlife conflicts, biological invasions; Conservation of biodiversity: <i>In-situ</i> and <i>Ex-situ</i> conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value; Environmental Pollution; Environmental Pollution: type, causes, effects, and controls; Air, Water, Soil and Noise pollution, Nuclear hazards and human health risks, ill effects of fireworks, Solid waste management: control measures of urban and industrial waste, pollution case studies; Environmental Policies & Practices; Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture, Environment laws; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act; International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context. Human Communities and the Environment; Human population growth: impact on environment, human health and welfare, Resettlement and rehabilitation of project affected persons; case studies, Disaster management: flood, earthquake, cyclone and landslides. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan, Environmental ethics: Role of Indian and other religions and cultures in environmental conservation, Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi). Field Work and visit.</p>

Manipal University Jaipur

Department of Mathematics and Statistics Minutes of the 7th Board of Studies meeting



F 1/MUJ/BOS/07 / 2015 - 2016

Date: May 6, 2016

Call to order: Meeting of Board of Studies in Mathematics and Statistics was convened on May 6, 2016 at 11:30 hrs at Board room, III floor, Faculty block V, Manipal University Jaipur.

Agenda:

The board having assembled proceeded to discuss the following agenda:

- Approval of entire amended syllabi of Mathematics in B.SC. (Pass Course) program with also swapping the two courses and renamed the some of the course structures (Attached as annexure 1).
- Approval of revamped the entire syllabi of mathematics in BCA program (Attached as annexure 2).
- Any other matter with permission

Members Present:

Invited members:

1. Prof. B. K. Sharma
Dean, Faculty of Science Research and Innovation
2. Prof. G. C. Tikkiwal
Director, School of Basic Sciences

External member:

3. Prof. P. R. Sharma
Professor, Department of Mathematics, University of Rajasthan, Jaipur

Internal members:

4. Dr. Sunil Joshi, Associate Professor and Head,
Department of Mathematics and Statistics
5. Dr. V. S. Kulhar, Professor
6. Dr. S. P. Gupta, Associate Professor
7. Dr. Vandana Suhag, Registrar (Ex Officio)

Internal Invitees:

8. Dr. Sumit Srivastava, Professor
9. Dr. Kalpna Sharma, Associate Professor

Leave of absence:

1. Dr. Amita Sharma, Professor of Statistics, Principal, Maharani College, Rajasthan University, Jaipur
2. Dr. Shalini Jain, Associate Professor (Internal member)

Amendments:

The course structures of above mentioned agendas were discussed in detail and the following suggestions were incorporated:

B. Sc. (Pass Course):

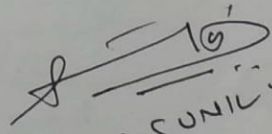
1. Rearranged the course contents of “**Differential Calculus and Integral Calculus**” (MA1111) and also increased the number of Text books and Reference books.
2. Rearranged the course contents of “**Algebra**” (MA1211) and added few more Text Books as well Reference books .
3. Rearranged and elaborated the course “**Differential equations**” (MA1311) and added new Text Books as well new Reference books.
4. Changed the nomenclature of the course “**Solid Geometry and Vector Calculus**” (MA 1312) as “**Solid Geometry**”. Vector Calculus is removed from third semester. Also increased content of the same and added new Text books as well Reference books.
5. Changed the nomenclature of the course “**Linear Programming Problems and its Applications**” (MA1411), vector calculus include and elaborated few topics. Modified nomenclature is “**Linear Programming Problems and Vector Calculus**”, and also increased the number of Text and Reference books.
6. Elaborated the topics in “**Dynamics**” (MA1412) and increased the number of Text and Reference books.
7. Small modifications in the course “**Real Analysis**” (MA 1511), and addition of few more Text as well Reference Books. .
8. Deleted the probability part from the course “**Numerical Analysis and Probability**” (MA1512) and renamed it as “**Numerical Analysis**”, and accordingly changed the Text as well Reference Books.
9. Small modification with addition of Text as well Reference Books in the course “**Complex Analysis**” (MA1611).

10. Changed the nomenclature of the course "**Discrete Mathematical Structure**" (MA1612) to "**Discrete Mathematics**" with some modifications and the addition of the Text as well as Reference Books.
11. With the concern of External invited expert and other dignitaries, it is decided that the courses **Discrete Mathematics** and **Algebra** will inter change from the coming academic session 2016-17, i.e. **Discrete Mathematics** will be in Second semester and **Algebra** in the Six semester.

BCA Program

1. Course contents of "**Mathematics- I**" (MA1121) has been completely changed.
2. Course "**Numerical Method**" (MA1221) has been replaced by a new course "**Mathematics-II**".
3. Course "**Random variable Stochastic Process**" (MA1321) has been replaced by "**Basic Statistics and Probability**".
4. Course "**Optimization Technique**" (MA1421) has been replaced by "**Numerical Methods**".

Modified Syllabi of B.Sc. (Pass Course) and BCA programs were approved by all the members and meeting ended with the thanks given by the Chair-person to all the members.


(Dr. SUNIL JOSHI)
HOD

15AC (D-3-3)	Revised Syllabi of Mathematics Courses in B Sc (Pass Course)	Approved.	Implemented from academic session 2016-17
15AC (D-3-4)	Modifications in Syllabi of Physics Courses in B Sc (Pass Course)	Approved.	Implemented from academic session 2016-17
15AC (D-4) FACULTY OF MANAGEMENT & COMMERCE			
15AC (D-4-1)	Syllabi of B Com (Hons.)	Approved. These courses are aligned with ACCA (Association of Chartered Certified Accountants).	Implemented from Academic session 2016-17
15AC (D-4-2)	Programme Elective (BBA)	Approved. The Council suggested that minimum student strength as per University guidelines be maintained for offering any elective programme.	Implemented from V and VI Semester of batch 2014-17
15AC (D-5) FACULTY OF DESIGN			
15AC (D-5-1)	Revision in the Scheme of BFA	The Council approved the proposed changes in the examination scheme of BFA Programme. The revised version of the scheme will be effective from academic session 2016-17. It was advised that a written test should be an integral component of the Practical Examination and that distribution of marks in end / in semester examination should follow the standard practice.	Implemented
15AC (D-6) FACULTY OF ARTS & LAW			
15AC (D-6-1)	Revision of BA (Hons) Economics Programme	The Council suggested revisiting the scheme, to make changes as required and follow the standard format for scheme and syllabi.	Implemented for I & II semester of batch 2016-19.

Department of Mathematics & Statistics	
Old	New (2016-17, 2017-18, 2018-19)
<p>MA1111 Differential Calculus and Integral calculus [3 1 0 4]</p> <p>Differential Calculus: Differentiability. Successive differentiation and Leibnitz Theorem. Rolle's Theorem. Mean Value Theorems, Taylor and Maclaurin's Theorems. Limits and continuity of functions of two variables. Asymptotes. Curvature, Concavity, convexity and points of inflection. Curve tracing, Tracing of Cartesian, Polar and Parametric Curves. Partial Differentiation: Euler's Theorem on homogeneous functions, total derivative of composite & implicit functions, Errors and approximations, Change of variables, maxima minima of function of two variables, Lagrange's multiplier method. Integral Calculus: Reduction formulae, Beta and Gamma functions and its application. Area and length of a curve, Volume and Surface area of solid of revolution.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. Shanti Narayan, Differential Calculus, S. Chand & Co., Delhi, 2012. 2. Shanti Narayan, Integral Calculus, S. Chand & Co., Delhi, 2012. 3. Pratiksha Saxena, Differential Calculus, McGraw Hill, New Delhi, 2015. <p>Reference Books:</p> <ol style="list-style-type: none"> 1 C.B. Thomas, Calculus and Analytical Geometry, Narosa Pub., Delhi, 1996. 2 N. Piskunov, Differential Calculus & Integral Calculus, Vol. 1 and II, Mir Pub., 1981. 1. R. Courant, and John F., Introduction to Calculus and Analysis, Vol. 1, Springer, 2000. 	<p>MA1111 DIFFERENTIAL CALCULUS AND INTEGRAL CALCULUS [3 1 0 4]</p> <p>Differential Calculus: Differentiability, Successive differentiation and Leibnitz Theorem, Rolle's Theorem. Mean Value Theorems, Taylor and Maclaurin's Theorems. Limits and continuity of functions of two variables. Asymptotes. Curvature, Concavity, convexity and points of inflection. Curve tracing, Tracing of Cartesian, Polar and Parametric Curves. Partial Differentiation: Euler's Theorem on homogeneous functions, total derivative of composite & implicit functions, Errors and approximations, Change of variables, maxima minima of function of two variables, Lagrange's multiplier method. Integral Calculus: Reduction formulae, Beta and Gamma functions and its application. Area and length of a curve, Volume and Surface area of solid of revolution. Multiple Integrals: Double integrals, Triple integral, Change of order of integration, Change of variables.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. Shanti Narayan, Differential Calculus, S. Chand & Co., Delhi, 2012. 2. Shanti Narayan, Integral Calculus, S. Chand & Co., Delhi, 2012. 3. Pratiksha Saxena, Differential Calculus, McGraw Hill, New Delhi, 2015. <p>Reference Books:</p> <ol style="list-style-type: none"> 1 C.B. Thomas, Calculus and Analytical Geometry, Narosa Pub., Delhi, 1996. 2 N. Piskunov, Differential Calculus & Integral Calculus, Vol. 1 and II, Mir Pub., 1981. 3. R. Courant, and John F., Introduction to Calculus and Analysis, Vol. 1, Springer, 2000.
<p>MA1211 ALGEBRA [3 1 0 4]</p>	<p>MA1212 DISCRETE MATHEMATICS [3 1 0 4]</p>

Group: Algebraic structure, Definition of a group with examples and simple properties, Subgroups, Cyclic groups, Permutation groups, Even and odd permutations, The alternating group A_n , Cayley theorem, Coset decomposition, Lagrange's theorem and its consequences, Fermat's and Euler's theorems, Normal subgroups, Quotient groups, Homomorphism and Isomorphism, The fundamental theorem of homomorphism.

Rings: Definition and properties of ring, integral domain and field.

Text Books:

1. Khanna and Bhambri, A course in Abstract Algebra, Vikas Publication House, 2015.
2. M. D. Raisinghania, Modern Algebra, S. Chand & Co., 2013.
3. A. R. Vashishtha, Modern Algebra, Krishna Prakashan, 2008.

Reference Books:

1. I. N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 2006.
2. N. S. Gopalkrishnan, University Algebra, New Age Int. Pub., 2008.
3. S. M. Lane, G. Birkhoff, Algebra, AMS Chelsea Pub., 1988.

Set Theory: Types of relations on sets and their properties, Relational matrix and the graph of a relation, Partitions, Equivalence relations, Poset, Hasse diagram. Definitions & Classification of functions, Characteristic function of a set, Hashing functions, Recursive functions, Permutation functions. **Combinatorics:** Discrete numeric function, Basic counting principles, Generating functions, Recurrence relations, Inclusion and exclusion principle, Euler's ϕ function and its applications to Cryptography.

Propositional Calculus: Logical connectives, Truth tables, Tautologies and contradictions, Contrapositive, Logical equivalences and implications, De

Morgan's Laws, Normal forms, Rules of inference, Arguments, Validity of arguments.

Predicate

Calculus: Free and bound variables, Quantifiers, Theory of inference, the rules of universal specification and generalization, Validity of arguments. **Graph Theory:**

Definition and examples of graphs, Incidence and degree, Handshaking lemma, Isomorphism Sub-graphs, Weighted Graphs, Walks, Paths and Circuits, Eulerian Graphs, Hamiltonian Graphs.

Trees: Definition and properties of trees, pendent vertices, center of a tree, rooted and binary tree, spanning tree, minimum spanning tree algorithms, fundamental circuits, cut-sets and cut vertices, fundamental cut-sets, the four color theorem. **Directed Graphs:** Types of digraphs, directed paths and connectedness, Directed trees.

Text Books:

1. R. P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction, Fourth Edition, Pearson Education Asia, 2002.
2. T. Veerarajan, Discrete Mathematics, Tata McGraw Hill, 2010.
3. S. K. Chakraborty, B. K. Sarkar, Discrete Mathematics, Oxford Univ. Press, 2012.

Reference Books:

1. B. Kolman, R. C. Busby, S. C. Ross, Discrete Mathematical Structures, Fourth Indian reprint, Pearson, 2003.

	<ol style="list-style-type: none"> 2. K. H. Rosen, Discrete Mathematics and Its Applications, McGraw Hill, 2012. 3. C. L. Liu, Elements of Discrete Mathematics, McGraw Hill, 2008. 4. J. P. Trembly, R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2003.
<p>MA1311 DIFFERENTIAL EQUATIONS [3 1 0 4]</p> <p>Equations of first order and first degree: Variables separable, reducible to variables separable form, homogeneous form, reducible to homogeneous form, linear equations, reducible to linear form, exact equations, reducible to exact form. Equations of first order but not of first degree: Equations solvable for x, y, p. Clairaut's form, Lagrange's form and singular solutions. Orthogonal trajectories. Higher order Linear differential equations with constant coefficients. Simultaneous differential equations. Linear differential equation of second order with variable coefficients: One part of complementary function known, reduction to normal form, change of independent variable, solution by means of operational factor and method of variation of parameters.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. G. F. Simmons, Differential Equations, Tata McGraw-Hill Education, 2006. 2. M. D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co., 2014. 3. S. L. Ross, Differential Equations, Wiley, 2013. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. E. A. Coddington, Theory of Ordinary Differential Equations, McGraw Hill, 2014. 2. J. L. Bansal, H. S. Dhama, Differential Equation, Vol-1, Jaipur Pub. House, 2012. 3. E. Rukmangadachari, Differential Equations, Pearson, 2012. 	<p>MA1311 DIFFERENTIAL EQUATIONS [3 1 0 4]</p> <p>Equations of first order and first degree: Variables separable, reducible to variables separable form, homogeneous form, reducible to homogeneous form, linear equations, reducible to linear form, exact equations, reducible to exact form. Equations of first order but not of first degree: Equations solvable for x, y, p. Clairaut's form, Lagrange's form and singular solutions. Orthogonal trajectories. Higher order Linear differential equations with constant coefficients. Homogeneous linear differential equations. Simultaneous differential equations. Linear differential equation of second order with variable coefficients: One part of complementary function known, reduction to normal form, change of independent variable, solution by means of operational factor and method of variation of parameters.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. G. F. Simmons, Differential Equations, Tata McGraw-Hill Education, 2006. 2. M. D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co., 2014. 3. S. L. Ross, Differential Equations, Wiley, 2013. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. E. A. Coddington, Theory of Ordinary Differential Equations, McGraw Hill, 2014. 2. J. L. Bansal, H. S. Dhama, Differential Equation, Vol-1, Jaipur Pub. House, 2012. 3. Rukmangadachari, Differential Equations, Pearson, 2012. 4. R. J. T. Bell, Elementary Treatise on Coordinary Geometry of Three Dimensions, MacMillan India Ltd. 1994.

	<p>5. P. K. Jain and Khalil Ahmad: A Textbook of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd. 1999.</p>
<p>MA1312 SOLID GEOMETRY [3 1 0 4]</p> <p>Conics: Tracing of conics. Tangent at any point to the conic, chord of contact, pole of line to the conic, director circle of conic. System of conics. Confocal conics. Polar equation of a conic, tangent and normal to the conic.</p> <p>Sphere: Equation of sphere, Tangent plane, Plane of contact and polar plane, Intersection of two spheres, radical plane, Coaxial spheres, Conjugate systems. Cone: Equation of a cone, Intersection of cone with a plane and a line, Enveloping cone, Right circular cone. Cylinder: Right circular cylinder and enveloping cylinder.</p> <p>Central Conicoids: Equation of tangent plane. Director sphere. Normal to the conicoids. Polar plane of a point. Enveloping cone of a coinoid. Enveloping cylinder of a coinoid. Ellipsoids, Hyperboloid of one and two sheet.</p> <p>Paraboloids: Circular section, Plane sections of conicoids.</p> <p>Text Books</p> <ol style="list-style-type: none"> 1. Shanti Narayan, P. K. Mittal, Analytical Geometry, S. Chand, 2010. 2. R. J. T. Bell, Elementary Treatise on Coordinary Geometry of Three Dimensions, MacMillan India Ltd. 1994. 3. P. K. Jain and Khalil Ahmad: A Textbook of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd. 1999. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. S. L. Loney, Elements of Coordinate Geometry, Scholarly Publishing Office, University of Michigan Library, 2005. 2. P.C. Golas, O. P. Tandon, S. L. Bhargava, Analytical Solid Geometry, Jaipur Pub. House, 2008. 	<p>MA1319 SOLID GEOMETRY [3 1 0 4]</p> <p>Conics: Tracing of conics, Tangent at any point to the conic, chord of contact, pole of line to the conic, director circle of conic. System of conics, Confocal conics, Polar equation of a conic, tangent and normal to the conic.</p> <p>Sphere: Equation of sphere, Tangent plane, Plane of contact and polar plane, Intersection of two spheres, radical plane, Coaxial spheres, Conjugate systems. Cone: Equation of a cone, Intersection of cone with a plane and a line, Enveloping cone, Right circular cone. Cylinder: Right circular cylinder and enveloping cylinder. Central Conicoids: Equation of tangent plane. Director sphere. Normal to the conicoids. Polar plane of a point. Enveloping cone of a coinoid, Enveloping cylinder of a coinoid, Ellipsoids, Hyperboloid of one and two sheet. Paraboloids: Circular section, Plane sections of conicoids.</p> <p>Generating lines. Confocal conicoids. Reduction of second degree equations.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. Shanti Narayan, P. K. Mittal, Analytical Geometry, S. Chand, 2010. 2. R. J. T. Bell, Elementary Treatise on Coordinary Geometry of Three Dimensions, MacMillan India Ltd. 1994. 3. P. K. Jain and Khalil Ahmad: A Textbook of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd. 1999 <p>Reference Books:</p> <ol style="list-style-type: none"> 1. S. L. Loney, Elements of Coordinate Geometry, Scholarly Publishing Office, University of Michigan Library, 2005. 2. P.C. Golas, O. P. Tandon, S. L. Bhargava, Analytical Solid Geometry, Jaipur Pub. House, 2008.
<p>MA1411 LINEAR PROGRAMMING AND VECTOR CALCULUS [3 1 0 4]</p> <p>Introduction: Mathematical formulation, Graphical method of solution, Theory and</p>	<p>MA1417 LINEAR PROGRAMMING PROBLEMS AND VECTOR CALCULUS [3 1 0 4]</p> <p>Introduction: Mathematical formulation, Graphical method of solution, Theory and</p>

<p>application of the simplex method, Charne's M-technique, two phase method. Duality: Primal, Dual, Dual programming problem, Fundamental theorem of duality with proof. Transportation Problems: North-west corner rule, Matrix-minima method, Vogel's approximation method, MODI method for optimal solution. Assignment Problems: Hungarian method, Travelling salesman problem.</p> <p>Vector Calculus: Differentiation. Gradient, Divergence and curl, line integral, surface integral, and volume integral. Green, Gauss and Stokes Theorems (without proof) and their applications.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. G. Hadley, Linear Programming, Narosa Publishing House, 1995. 2. R. K. Gupta, Linear Programming, Krishna Prakashan, 2010. 3. Shanti Narayan, P. K. Mittal, A Textbook of Vector Analysis, S. Chand & Co., 2013. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. S. I. Gass, Linear Programming: Methods and Applications, McGraw Hill, New York, 1985. 2. S. D. Sharma, Operation Research, Kedarnath and Ram Nath Publication, 2006. 3. Hamdy A. Taha, Operations Research: An Introduction, PHI, 2006. 4. J. E. Marsden, A. Tromba, Vector Calculus, W. H. Freeman, 2003. 	<p>application of the simplex method, Charne's M-technique, two phase method. Duality: Primal, Dual, Dual programming problem, Fundamental theorem of duality with proof. Transportation Problems: North-west corner rule, Matrix-minima method, Vogel's approximation method, MODI method for optimal solution. Assignment Problems: Hungarian method, Travelling salesman problem.</p> <p>Vector Calculus: Differentiation. Gradient, Divergence and curl, line integral, surface integral, and volume integral. Green, Gauss and Stokes Theorems and their applications.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. G. Hadley, Linear Programming, Narosa Publishing House, 1995. 2. R. K. Gupta, Linear Programming, Krishna Prakashan, 2010. 3. Shanti Narayan, P. K. Mittal, A Textbook of Vector Analysis, S. Chand & Co., 2013. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. S. I. Gass, Linear Programming: Methods and Applications, McGraw Hill, New York, 1985. 2. S. D. Sharma, Operation Research, Kedarnath and Ram Nath Publication, 2006. 3. Hamdy A. Taha, Operations Research: An Introduction, PHI, 2006. 4. J. E. Marsden, A. Tromba, Vector Calculus, W. H. Freeman, 2003.
<p>MA1412 DYNAMICS [3 1 0 4]</p> <p>Kinematics: Radial, Transverse, tangential, normal velocities and accelerations. SHM: Repulsion from a fixed point, Motion under inverse square Law, Hooke's law, Horizontal and vertical elastic strings. Projectiles: Motion of a projectile and its trajectory, Time of flight, Horizontal range, Greatest height, Range and time of flight up and down an inclined plane. Work Energy and Impulse: Conservation of linear momentum, Principle of conservation of energy, Uniform circular motion, Motion on a smooth curve in a vertical plane, Motion on the</p>	<p>MA1412 DYNAMICS [3 1 0 4]</p> <p>Kinematics: Radial, Transverse, tangential, normal velocities and accelerations. SHM: Repulsion from a fixed point, Motion under inverse square Law, Hooke's law, Horizontal and vertical elastic strings. Projectiles: Motion of a projectile and its trajectory, Time of flight, Horizontal range, Greatest height, Range and time of flight up and down an inclined plane. Work Energy and Impulse: Conservation of linear momentum, Principle of conservation of energy. Uniform circular motion: Motion on a smooth curve in a vertical plane, Motion on the inside of a smooth vertical circle, Cycloidal motion. Motion in the resisting medium:</p>

<p>inside of a smooth vertical circle, Cycloidal motion.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. A. S. Ramsey, Dynamics (Part I), The English Language Book Society and Cambridge University Press, 1962. 2. M. Ray, G. C. Sharma, A Text Book on Dynamics, S. Chand & Co., 2006. 3. M. D. Raisinghania, Dynamics, S. Chand & Co., 2015. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. W. H. Besant, A. S. Ramsey, A Treatise on Hydromechanics (Part I), G. Bell and Sons Ltd., London, 1960. 	<p>Resistance varies as velocity and square of velocity. Central orbits. Kepler's laws of planetary motion.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. A. S. Ramsey, Dynamics (Part I), The English Language Book Society and Cambridge University Press, 1962. 2. M. Ray, G. C. Sharma, A Text Book on Dynamics, S. Chand & Co., 2006. 3. M. D. Raisinghania, Dynamics, S. Chand & Co., 2015. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. W. H. Besant, A. S. Ramsey, A Treatise on Hydromechanics Part I), G. Bell and Sons Ltd., London, 1960.
<p>MA1511 REAL ANALYSIS [3 1 0 4]</p> <p>Real Numbers: Real numbers as a complete ordered field, Limit point, Bolzano Weierstrass theorem, Closed and open sets, Union and intersection of such sets, Concept of compactness, Heine Borel theorem, Connected sets. Sequence: Real Sequences, Limit and convergence of a sequence, Monotonic sequences, Cauchy's sequence, Subsequence, Cauchy's general principle of convergence. Infinite Series: Convergence infinite series, Tests of convergence (with proof): Comparison test, Ratio test, Cauchy's root test, Raabe's test, Logarithmic test, Integral test, Cauchy's condensation test, Gauss's test alternating series, Leibnitz's theorem, Absolute and conditional convergence, Taylor's and Maclaurin's expansion of functions.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. S. C. Malik, Principal of Real Analysis, New Age Int., New Delhi, 2015. 2. S. Shastri, Real Analysis, Springer, 2010. 3. Shanti Narayan, Elements of Real Analysis, S. Chand & Co., 2003. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. R. G. Bartle, D. R. Sherbert, Introduction to Real Analysis, Wiley, 2015. 2. T. M. Apostol, Real Analysis, Narosa Pub. House, 2004. 3. N. L. Carothers, Real Analysis, Cambridge Univ. Press, 2000. 	<p>MA1511 REAL ANALYSIS [3 1 0 4]</p> <p>Real Numbers: Real numbers as a complete ordered field, Limit point, Bolzano Weierstrass theorem, Closed and open sets, Union and intersection of such sets, Concept of compactness, Heine Borel theorem, Connected sets. Sequence: Real Sequences, Limit and convergence of a sequence, Monotonic sequences, Cauchy's sequence, Subsequence, Cauchy's general principle of convergence. Infinite Series: Convergence of infinite series, Tests of convergence (with proof): Comparison test, Ratio test, Cauchy's root test, Raabe's test, Logarithmic test, Integral test, Cauchy's condensation test, Gauss's test, Alternating series, Leibnitz's theorem, Absolute and conditional convergence, Taylor's and Maclaurin's expansion of functions. Improper Integrals: Convergence of improper integrals and their properties, Convergence of Beta and Gamma functions, Differentiation and integration of a function under the sign of integral.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. S. C. Malik, Principal of Real Analysis, New Age Int., New Delhi, 2015. 2. S. Shastri, Real Analysis, Springer, 2010. 3. Shanti Narayan, Elements of Real Analysis, S. Chand & Co., 2003. Reference Books: <ol style="list-style-type: none"> 1. R. G. Bartle, D. R. Sherbert, Introduction to Real Analysis, Wiley, 2015. 2. T. M. Apostol, Real Analysis, Narosa Pub. House, 2004.

<p>4. A. Kumar, S. Kumaresan, A Basic Course in Real Analysis, CRC Press, 2014.</p>	<p>3. N. L. Carothers, Real Analysis, Cambridge Univ. Press, 2000. 4. A. Kumar, S. Kumaresan, A Basic Course in Real Analysis, CRC Press, 2014.</p>
<p>MA1512 NUMERICAL ANALYSIS [3 1 0 4]</p> <p>Finite Differences and Interpolation: Difference operators and relations between them, Newton's formulae for forward and backward interpolation, Newton's divided difference formula, Lagrange's interpolation formula. Gauss's, Stirling's and Bessel's interpolation formulae. Numerical Differentiation. Numerical Integration: Newton-Cote's formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule, Weddle rule and Gauss's quadrature formulae. Numerical Solution of Algebraic and Transcendental Equations: Bisection method, Regula Falsi method, Secant method, Method of iteration, Newton Raphson Method. Solution of system of linear equations: Gauss elimination method, Gauss-Jordan method, Gauss-Jacobi method, Gauss-Seidal method.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. G. Haribhaskaran, Numerical Methods, Laxmi Pub., 2008. 2. B. S. Grewal, Numerical Methods, Khanna Publishers, 2006. 3. J. L. Bansal, J. P. N. Ojha, Numerical Analysis, Jaipur Pub. House, 2008. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Srimanta Pal, Numerical Methods, Oxford University Press, Delhi 2012. 2. S. S. Shastri, An Introductory Methods in Numerical Analysis, PHI, 2005. 3. M. K. Jain, S. R. K. Iyenger. R. K. Jain, Numerical Methods, New Age Int. Pub., 2015. 	<p>MA1513 NUMERICAL ANALYSIS [3 1 0 4]</p> <p>Finite Differences and Interpolation: Difference operators and relations between them, Newton's formulae for forward and backward interpolation, Newton's divided difference formula, Lagrange's interpolation formula. Gauss's, Stirling's and Bessel's interpolation formulae. Numerical Differentiation. Numerical Integration: Newton-Cote's formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule, Weddle rule and Gauss's quadrature formulae. Numerical Solution of Algebraic and Transcendental Equations: Bisection method, Regula Falsi method, Secant method, Method of iteration, Newton Raphson Method. Solution of system of linear equations: Gauss elimination method, Gauss-Jordan method, Gauss-Jacobi method, Gauss-Seidal method. Numerical Solution of Initial Value Problems: Picard's Method, Euler's and modified Euler's method, Runge-Kutta second and fourth order method.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. G. Haribhaskaran, Numerical Methods, Laxmi Pub., 2008. 2. B. S. Grewal, Numerical Methods, Khanna Publishers, 2006. 3. J. L. Bansal, J. P. N. Ojha, Numerical Analysis, Jaipur Pub. House, 2008. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Srimanta Pal, Numerical Methods, Oxford University Press, Delhi 2012. 2. S. S. Shastri, An Introductory Methods in Numerical Analysis, PHI, 2005. 3. M. K. Jain, S. R. K. Iyenger. R. K. Jain, Numerical Methods, New Age Int. Pub., 2015.

<p>MA1611 COMPLEX ANALYSIS [3 1 0 4]</p> <p>Calculus: Complex valued function, Limits, Continuity, Differentiability, Complex plane, Connected and compact sets, Statement of Jordan curve theorem, Extended complex plane, Stereographic projection. Analytic functions: CR equations (Cartesian and polar form), Harmonic functions, Construction of an analytic function. Conformal Mappings. Bilinear Transformations and Its Properties. Power Series: Absolute convergence, Cauchy Hadamard theorem, Radius of convergence, Analyticity of sum function of a power series. Complex Integration: Complex line integral, Cauchy's integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions, Cauchy's integral formula, Analyticity of the derivative of analytic function, Liouville's theorem, Poisson's integral formula, Morera's theorem, Taylor's and Laurent's series, Maximum modulus principle. Singularities: Branch points, Kinds of singularities, Monomorphic functions, Entire functions, Riemann's theorem, Cauchy-Weierstrass theorem.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. R.V. Churchill, J. W. Brown, Complex Variables and Applications, McGraw Hill, 2000. 2. Shanti Narayan, P. K. Mittal, Complex Variables, S. Chand & Co., 2014. 3. S. Ponnusamy, Foundations of Complex Analysis, Narosa Pub. House, 2008. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. J. B. Conway, Functions of One Complex Variable, Springer Int. St. Ed., Narosa Publishing House, 2000. 2. A. R. Vashishtha, Complex Analysis, Krishna Prakashan, 2010. 3. G. N. Purohit, S. P. Goyal, Complex Analysis, Jaipur Pub. House, 2005. 	<p>MA1611 COMPLEX ANALYSIS [3 1 0 4]</p> <p>Complex valued function, Limits, Continuity, Differentiability, Complex plane, Connected and compact sets, Statement of Jordan curve theorem, Extended complex plane, Stereographic projection. Analytic functions: CR equations (Cartesian and polar form), Harmonic functions, Construction of an analytic function. Conformal Mappings. Bilinear Transformations and Its Properties. Power Series: Absolute convergence, Cauchy Hadamard theorem, Radius of convergence, Analyticity of sum function of a power series. Complex Integration: Complex line integral, Cauchy's integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions, Cauchy's integral formula, Analyticity of the derivative of analytic function, Liouville's theorem, Poisson's integral formula, Morera's theorem, Taylor's and Laurent's series, Maximum modulus principle. Singularities: Branch points, Kinds of singularities, Monomorphic functions, Entire functions, Riemann's theorem, Cauchy-Weierstrass theorem.</p> <p>Text Books:</p> <ol style="list-style-type: none"> 1. R.V. Churchill, J. W. Brown, Complex Variables and Applications, McGraw Hill, 2000. 2. Shanti Narayan, P. K. Mittal, Complex Variables, S. Chand & Co., 2014. 3. S. Ponnusamy, Foundations of Complex Analysis, Narosa Pub. House, 2008. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. J. B. Conway, Functions of One Complex Variable, Springer Int. St. Ed., Narosa Publishing House, 2000. 2. A. R. Vashishtha, Complex Analysis, Krishna Prakashan, 2010. 3. G. N. Purohit, S. P. Goyal, Complex Analysis, Jaipur Pub. House, 2005. 4. Shantinarayan, Complex Variables, S. Chand & Co., New Delhi, 2010.
<p>MA1612 DISCRETE MATHEMATICS [3 1 0 4]</p>	<p>MA1613 ALGEBRA [3 1 0 4]</p>

Set Theory: Types of relations on sets and their properties, Relational matrix and the graph of a relation, Partitions, Equivalence relations, Poset, Hasse diagram. Definitions & Classification of functions, Characteristic function of a set, Hashing functions, Recursive functions, Permutation functions.

Combinatorics: Discrete numeric function, Basic counting principles, Generating functions, Recurrence relations, Inclusion and exclusion principle, Euler's ϕ function and its applications to Cryptography. **Propositional Calculus:** Logical connectives, Truth tables, Tautologies and contradictions, Contrapositive, Logical equivalences and implications, De Morgan's Laws, Normal forms, Rules of inference, Arguments, Validity of arguments.

Predicate Calculus: Free and bound variables, Quantifiers, Theory of inference, the rules of universal specification and generalization, Validity of arguments. **Graph Theory:** Definition and examples of graphs, Incidence and degree, Handshaking lemma, Isomorphism

Sub-graphs, Weighted Graphs, Walks, Paths and Circuits, Eulerian Graphs, Hamiltonian Graphs. **Trees:** Definition and properties of trees, pendent vertices, center of a tree, rooted and binary tree, spanning tree, minimum spanning tree algorithms, fundamental circuits, cut-sets and cut vertices, fundamental cut-sets, the four color theorem. **Directed Graphs:** Types of digraphs, directed paths and connectedness, Directed trees.

Text Books:

1. R. P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction, Fourth Edition, Pearson Education Asia, 2002.
2. T. Veerarajan, Discrete Mathematics, Tata McGraw Hill, 2010.
3. S. K. Chakraborty, B. K. Sarkar, Discrete Mathematics, Oxford Univ. Press, 2012.

Reference Books:

1. B. Kolman, R. C. Busby, S. C. Ross, Discrete Mathematical Structures, Fourth Indian reprint, Pearson, 2003.
2. K. H. Rosen, Discrete Mathematics and Its Applications, McGraw Hill, 2012.
3. C. L. Liu, Elements of Discrete Mathematics, McGraw Hill, 2008.
4. J. P. Trembly, R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill Pub. Co. Ltd, New Delhi, 2003.

Group: Algebraic structure, Definition of a group with examples and simple properties, Subgroups, Cyclic groups, Permutation groups, Even and odd permutations, The alternating group A_n , Cayley theorem, Coset decomposition, Lagrange's theorem and its consequences, Fermat's and Euler's theorems, Normal subgroups, Quotient groups, Homomorphism and Isomorphism, The fundamental theorem of homomorphism.

Rings: Definition and properties of ring, integral domain and field.

Text Books:

1. Khanna and Bhambri, A course in Abstract Algebra, Vikas Publication House, 2015.
2. M. D. Raisinghania, Modern Algebra, S. Chand & Co., 2013.
3. A. R. Vashishtha, Modern Algebra, Krishna Prakashan, 2008.

Reference Books:

1. I. N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 2006.
2. J. A. Gallien, Contemporary Abstract Algebra, Narosa Pub. House, New Delhi, 2008.
3. M. Artin, Algebra, PHI, New Delhi, 2011.

