

Syllabus for Bachelor of Science

I-Year (Semester-I)

Session 2019-2020

Code	Description	Pd/W	Exam	CIA	ESE	Total
BSMT111	Algebra	3	3 hrs	20	80	100
BSMT112	Differential Calculus	3	3 hrs	20	80	100
BSMT113	Co-ordinate Geometry of Two and Three Dimensions	3	3 hrs	20	80	100
	Total			60	240	300

BSMT111: ALGEBRA		
Unit-I	Matrix: The characteristic equation of matrix: Eigen Values and Eigen Vectors, Diagonalization of matrix, Cayley-Hamilton theorem(Statement and proof),and its use in finding the inverse of a Matrix.	9
Unit-II	Theory of equation: Relation between roots and coefficient of the equation Symmetric function of roots. Solution of cubic equation by Cordon's method and Biquadratic equitation by Ferrari's method.	9
Unit-III	Infinite series: Convergent series, convergence of geometric series, And necessary condition for the convergent series, comparison tests: Cauchy root test.	9
Unit-IV	D'Alembert's Ratio test, Logarithmic test, Raabe's test, De' Morgan and Bertrand's test, Cauchy's condensation test, Leibnitz's test of alternative series, Absolute convergent.	9
Unit-V	Inequalities and Continued fractions.	9

Suggested Readings:

1. Bhargav and Agarwal:Algebra, Jaipur publishing House, Jaipur.
2. Vashistha and Vashistha : Modern Algebra, Krishna Prakashan, Meerut.
3. Gokhroo, Saini and Tak: Algebra,Navkar prakashan, Ajmer..
4. M-Ray and H. S. Sharma: A Text book of Higher Algebra, New Delhi,

BSMT112: Differential Calculus		
Unit-I	Polar Co-ordinates, Angle between radius vector and the tangents. Angle between curves in polar form, length of polar subs tangent and subnormal, pedal equation of a curve, derivatives of an arc.	9
Unit-II	Curvature various formula, centre of curvature and chord of curvature and related problems. Partial differentiation, Euler's theorem on homogenous function, chain rule of partial differentiation.	9
Unit-III	Maxima and Minima of functions of two variables and of three variables connected by a relation, Lagrange's Method of undetermined multipliers. Asymptotes, determination of asymptotes intersection of curve and its asymptotes.	9
Unit-IV	Double point , node, cusp, necessary conditions for existence of double points, classification of double point, nature of double points at origin, curve tracing, procedure for tracing Cartesian and polar curves.	9
Unit-V	Envelopes: Envelope of family of curve having one parameter and also of two parameters, related by a relation, Evolutes. Taylor's Theorem, Maclaurin's Theorem. Expansion of Function e.g. Sin x Cos x. e^x , $\log_e(1+x)$.	9

Suggested Readings:

1. Bansal. Bhargav and Agarwal : Differential Calculus II, Jaipur Publishing House, Jaipur.
2. Gokhroo, Saini : A Text Book of Differential Calculus II, Navkar prakashan, Ajmer
3. Gupta, Juneja and Tandon: Differential Calculus, Ramesh Book Depot, Jaipur.
4. Shanti Narayan : Differential Calculus , S.Chand and Co., New Delhi.
5. M. Ray & G.C. Sharma : Differential Calculus, Shivlal agarwal & Co., Agra.
6. Schaum's outline series : Theory and problems of Advanced Cal., New York.

BSMT113: CO-ORDINATE GEOMETRY OF TWO AND THREE DIMENSIONS		
Unit-I	General equation of second degree, Nature of conic, tracing of conics.	9
Unit-II	Polar equations, Polar equations of a conic, polar equation of tangents, perpendicular lines and normal, director circle of conic and related simple problems.	9
Unit-III	3-D: Sphere: Definition of sphere, equation of sphere in various form i.e. General form, simple form, Plane section of the sphere, Great circle, sphere through given circle, diameter form of the equation of the sphere, power of a point, Tangent plane& Tangent line of sphere, pole and polar plane, properties of poles and polars.	9
Unit-IV	Cone: Definition of cone, equation of cone, enveloping cone condition of tangency, reciprocal cone and right circular cone.	9
Unit-V	Cylinder: definition of cylinder, enveloping cylinder, equation of enveloping cylinder, right circular cylinder.	9

Suggested Readings:

1. Bhargav, Agarwal and Gupta: Co-ordinate Geometry in two dimensions, JPH, Jaipur.
2. Gokhroo, Saini and Ojha, Two Dimensional Co-ordinate Geometry, Navkar Publication, Ajmer.
3. N.Saran and R.S.Gupta : Analytical Geometry of three dimensions , Pothisala Pvt.Ltd , Allahabad.
4. Gorakh Prasad and H.C.Gupta : Text book on Coordinate Geometry , Pothisala Pvt. Ltd., Allahabad
5. Sharma & Jain : Co-ordinate Geometry, Galgotia Publication, Dariyaganj , New Delhi.
6. S.L.Loney : The Elements of Coordinate Geometry , Macmillan and Co., London

Syllabus for Bachelor of Science

I-Year (Semester-II)

Session 2019-2020

Code	Description	Pd/W	Exam	CIA	ESE	Total
BSMT211	Differential Equations	3	3 hrs	20	80	100
BSMT212	Integral calculus and Vector calculus	3	3 hrs	20	80	100
BSMT213	Co-ordinate Geometry of Three Dimensions	3	3 hrs	20	80	100
	Total			60	240	300

BSMT211: DIFFERENTIAL EQUATIONS		
Unit-I	Linear equations. Differential equations of first order and first degree, Linear differential equation, reducible to linear equations, exact differential equations and reducible to exact differential equations.	9
Unit-II	First order and higher degree differential equations solvable for x, y, p. Clairaut's form.	9
Unit-III	Second and higher order Linear differential equation with constant coefficients.	9
Unit-IV	Simultaneous differential equations and also of the type $dx/P=dy/Q=dz/R$. Homogeneous linear differential equation with variable coefficients and the equation reducible to homogeneous form.	9
Unit-V	Second order linear differential equations: exact differential equations of higher order and the differential equations reducible to exact form. Normal form, solution of equations when one part of C.F. is known, change of independent variables, Series solution of first kind of Bessel and Legendre equations.	9

Suggested Readings:

1. Bansal, Bhargav and Agarwal : Differential Equations, JPH, Jaipur .
2. Gokhroo, Saini and Bhati: Differential Equations, Navkar prakashan, Ajmer.
3. Bansal and Dhama : Differential Equations (Vol. II), JPH, Jaipur.
4. D.A. Murray : Introductory course on Differential Equations, Orient Longman
5. I. N. Sneddon : Elements of Partial Differential Equations , TMH
6. Zafar Ahsan : Differential Equations & their applications, PHI ,New Delhi.
7. A.R. Forsyth : A Treatise on Differential Equations , Macmillan and Co. Ltd, London
8. Frank Ayres : Theory and Problems of Differential Equations, TMH.

BSMT212: INTEGRAL CALCULUS AND VECTOR CALCULUS		
Unit-I	Beta and gamma functions: properties and problem based on it., differentiation under the sign of integration.	9
Unit-II	Rectification, Volume and Surface area of solid of revolution.	9
Unit-III	Evaluation of double and triple integration in Cartesian and polar coordinates, Change from Cartesian to polar form, change of order of integration, Dirichlet's integral.	9
Unit-IV	Gradient, Divergence and curl, identities involving these operators and related problems.	9
Unit-V	Vector integration: Gauss divergence theorem, Stoke's theorem, Green's theorem (without proof of each theorem) and their applications.	9

Suggested Readings:

1. Bhargav and Banvri Lal: Vector calculus, Jaipur publishing house, Jaipur.
2. Gorakh Prasad : A text book on Integral Calculus , Pothishala Pvt .Ltd , Allahabad.
3. Sharma & Jain : Integral Calculus, Galgotia Publication, Dariyaganj ,New Delhi.
4. Shanti Narayan : Integral Calculus , S.Chand and Co., New Delhi.
5. Shanti Narayan : A text book of Vector Calculus, S.Chand and Co. New Delhi
6. Ray and Sharma : Vector algebra & Calculus, Students and Friends Co. Agra
7. Erwin Kreyszig : Advanced Engineering Mathematics, John Wiley and sons.
8. Muray R. Spiegel : Vector Analysis, Schaum Publishing Company , New York.
9. Saran and Nigam : Introduction to Vector Analysis, Pothisala Pvt. Ltd, Allahabad.

BSMT213: CO-ORDINATE GEOMETRY OF THREE DIMENSIONS		
Unit-I	Central conicoid, Tangent lines and Tangent planes, Nature and shape of ellipsoid, condition of tangency, equation of director sphere, pole and polar plane, Polar lines, equation of polar line, section with a given centre, Enveloping cone, equation of enveloping cone, Asymptotic cone, cone as a central surface.	9
Unit-II	Normal to a conicoid, Number of a normal drawn from an external point to the ellipsoid, cubic curve through the feet of six normal's, cone through six normal's, diameter of a conicoid, equation of a Diametral plane, conjugate semi diameter plane, conjugate semi diameters	9
Unit-III	Paraboloid, Intersection of a line and a paraboloid, condition of tangency, important standard results, equation of normal's, Normal to a paraboloid from a given point, cubic curve through the feet of normal's, cone through the five normal's.	9
Unit-IV	Plane section of conicoid, Nature of the plane section of a central conicoid, Axes and area of a central plane of a central conicoids, Axes and area of non-central plane, section of central conicoid, axes & Area of the plane section of a paraboloid, circular section of the conicoid, circular section of ellipsoid, hyperboloid, paraboloid, Umbilics of ellipsoid and paraboloid..	9
Unit-V	Generating lines condition for generators of central conicoid, Generating lines of λ and μ -system and its properties, Intersection of generators through two points of principal elliptic section of a hyperboloid of one sheet	9

Suggested Readings:

1. N.Saran and R.S.Gupta , Analytical Geometry of three dimensions , Pothisala Pvt.Ltd , Allahabad.
2. Gorakh Prasad and H.C.Gupta ,Text book on Coordinate Geometry , Pothisala Pvt. Ltd., Allahabad
3. The Elements of Coordinate Geometry, S.L.Loney, Macmillan and Co., London
4. R.J.T.Bell, Elementary Treatise on Coordinate Geometry of Three Dimensions,Macmillan India Ltd

Syllabus for Bachelor of Science

II-Year (Semester-III)

Session 2020-2021

Code	Description	Pd/W	Exam	CIA	ESE	Total
BSMT311	Partial Differential Equations and Laplace Transforms	3	3 hrs	20	80	100
BSMT312	Numerical Analysis	3	3 hrs	20	80	100
BSMT313	Dynamics of a Particle	3	3 hrs	20	80	100
	Total			60	240	300

BSMT311- PARTIAL DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS		
Unit-I	Partial differential equations: Definition, order and degree, Formation of a PDE by elimination of arbitrary constant and function, solution of Lagrange's equation, Solution of non linear partial differential equation of the form $f(p,q)=0$ and $z=px+qy+f(p,q)$ (without using general method).	9
Unit-II	Solution of non linear partial differential equation of the form $f(p,q)=0$, $f(z,p,q)=0$ and $f_1(x,p)=f_2(p,q)$ Charpit's method.	9
Unit-III	Laplace transform : Definition of Laplace transform, properties of Laplace transform, Linearity properties, shifting property, change of scale property, Laplace transform of integral of the function of the type $f(t)/t$, periodic function, Convolution theorem, Laplace transform of derivatives of functions.	9
Unit-IV	Inverse Laplace transform: Properties of inverse Laplace transform: linear property, shifting property, change of scale property, Inverse Laplace transform of derivatives of functions and Inverse Laplace transform of function of the type $f(p)/p$.	9
Unit-V	Application of Laplace transform: Solution of ordinary differential equations with constant and variable coefficients, solution of simultaneous ordinary differential equations.	9

Suggested Readings:

1. Gokhroo, Saini, Ojha : Partial differential equations, Navkar Prakashan, Ajmer.
2. M.D.Raishinghania : Partial differential equation, S. chand and Co., New Delhi.
3. Goyal andGupta : Laplace and Fourier transform, Pragati prakashan, Meerut.

BSMT 312- NUMERICAL ANALYSIS		
Unit-I	Difference operators and factorial notation, Differences of polynomial, relation between operators E , Δ and ∇ , interpolation and extrapolation, forward and backward interpolation, Newton-Gregory forward and backward formulae for interpolations.	9
Unit-II	Interpolation with unequal intervals, Lagrange's interpolation formula, divided differences, properties of divided differences, Newton's divided differences formula for unequal intervals.	9
Unit-III	Central difference interpolation: Sheppard's central difference operators, relation between operators E , Δ , ∇ , δ , and μ . Gauss's forward, backward and central interpolation formula, Sterling's interpolation formula for central difference, Bessel's interpolation formula.	9
Unit-IV	Numerical differentiation, Numerical integrations: General Quadrature Formula, Trapezoidal rule, Simpson's 1/3, 3/8 rule and Weddle's rule.	9
Unit-V	Solution of algebraic and transcendental equations: Bisection method, Regula Falsi method, iterative method and Newton-Raphson method, Fitting of a straight line and parabola by using least square method.	9

Suggested Readings:

1. Goyal, Mittal : Numerical Analysis, Pragati Prakashan, Merrut.
2. Bansal, Bhargava : Numerical Analysis, JPH, Jaipur.
3. Saxena, H.C. : Finite differences & Numerical analysis, S.Chand & Co., New Delhi.
4. M.K.Jain, Iyengar : Numerical Methods Problems and Solutions ,New Age International Ltd.
5. Sastry S.S. : Introductory methods of Numerical analysis, Prentice Hall of India Private Limited, New Delhi.

BSMT-313 DYNAMICS OF A PARTICLE		
Unit-I	Kinematics: Radial and Transverse velocities and accelerations. Angular velocity and acceleration, Tangential and Normal velocities and acceleration	9
Unit-II	Simple Harmonic motion, Hook's law, Motion of a particle attached to horizontal and vertical elastic strings	9
Unit-III	Motion in a plane under variable forces, Inverse square law of motion, Motion in a resisting medium (resistance varies as a velocity and square of the velocity)	9
Unit-IV	Circular and Cycloidal motion of a Particle on smooth and rough vertical plane curve	9
Unit-V	Central orbits, Apse, time in orbit	9

Suggested Readings:

1. S.L. Loney : Dynamics of a particle and Rigid bodies, University press,Cambridge.
2. Ray, M : A Text book on Dynamics, S. Chand & Co.,New Delhi.
3. Gokhroo, Saini & Yadav : Higher Dynamics II, Navkar Publications, Ajmer .
4. Bhargava, Agarwal : Dynamics of a particle, JPH, Jaipur.
5. Ramsey A.S. :Dynamics, CBS Publishers and distributors
6. Vasishtha A.R.; Gupta : Dynamics of a Particle, Krishna Prakhasan Mandir, Meerut.

Syllabus for Bachelor of Science

II-Year (Semester-IV)

Session 2020-2021

Code	Description	Pd/W	Exam	CIA	ESE	Total
BSMT411	Optimization Techniques	3	3 hrs	20	80	100
BSMT412	Abstract Algebra	3	3 hrs	20	80	100
BSMT413	Statics	3	3 hrs	20	80	100
	Total			60	240	300

BSMT 411 OPTIMIZATION TECHNIQUES		
Unit-I	Introduction to Linear Programming Problems, mathematical formulations, Graphical method of solution of linear programming problems for two variables, Theory of convex sets and their properties.	9
Unit-II	Initial basic feasible solution, improved BFS, slack and surplus variables, entering and departing elements, The simplex technique and its application to solve L.P. problems.	9
Unit-III	Artificial Variables, Big-M and Two Phase method to solve a linear programming problem.	9
Unit-IV	Dual and primal problems, standard form of a primal, formation of dual of a standard primal, fundamental theorem of duality, solution of a LPP by solving its dual by simplex method.	9
Unit-V	Assignment and Transportation problems and their optimum solutions.	9

Suggested Readings:

1. Gokhroo, Saini : Linear Programming , Navkar pub., Ajmer.
2. Mittal, Sethi : Linear Programming, Pragati Prakashan, Meerut.
3. Bhargava, Sharma, Bhati : Optimization Theory, JPH, Jaipur.
4. Kanti Swaroop, Gupta P.K. and Manmohan : Sultan Chand and sons, New Delhi.
5. H.A.Taha , Macmillan : Operations Research, Publishing Company , New York.
6. Sharma & Jain, Operations Research, Students friends & Co., New Delhi.
7. Operations research, S.D. Sharma, Kedarnath & Ramnath Co., Meerut
8. Gupta P.K. and Hira D.S. : Problems in O.R., S.Chand and Co., New Delhi.

BSMT412 - ABSTRACT ALGEBRA		
Unit-I	Group and its properties, order of an element of a group, permutation group and cyclic group.	9
Unit-II	Sub group, Cyclic sub group, Coset decomposition, index of a subgroup, Lagrange's theorem and its consequences. Fermat's and Euler's theorems.	9
Unit-III	Normal subgroup with properties, simple subgroups, quotient groups, group homomorphism, its kernel and properties, Isomorphism, fundamental theorem of homomorphism.	9
Unit-IV	Rings: Definition and kinds of rings, integral domain, division ring, sub ring, ring homomorphism and ring isomorphism.	9
Unit-V	Field: Definition and properties, sub field, prime field, imbedding of an integral domain in a field, field of quotients.	9

Suggested Readings:

1. Sharma, G.C. : Modern Algebra, [Shiva Lal Agarwala & Company, Agra](#)
2. Bansal & Bhargava : Abstract Algebra , JPH, Jaipur.
3. Agarwal, R.S. : Text Book on Modern Algebra, S.Chand and Co., New Delhi.
4. Gokhroo & Saini : Abstract Algebra, Navkar publications, Ajmer.
- 5.K. C. Sarangi , Elements of Abstract Algebra, RBD, Jaipur.
- 6.P.B.Bhattacharya , S.K.Jain and S.R.Nagpaul,Basic Abstract Algebra,Cambridge University Press.

BSMT413 STATICS

Unit-I	Equilibrium of a body under several coplanar forces, Reduction of a system of coplanar forces into a force and a couple, Equation of resultant force, equilibrium of a rigid body under the action of three coplanar forces, equilibrium of a rigid body under the action of more than three coplanar forces.	9
Unit-II	Friction: Force of Friction, Kinds of Friction, Angle of Friction, Coefficient of friction, Relation between angle of friction and coefficient of friction, Laws of friction, limiting equilibrium on an inclined plane, least force required to pull a body up or down an inclined rough plane.	9
Unit-III	Virtual work: Principle of virtual work for a system of coplanar forces acting on a particle, Principle of virtual work for a number of coplanar forces acting at different points of a rigid body, forces which can be omitted in forming the equation of virtual work, Problems involving elastic strings and curves,	9
Unit-IV	Common catenary: Definition and equation of common catenary (Intrinsic, Cartesian), Shape of the common catenary, Approximation of the common catenary.	9
Unit-V	Forces in three dimensions, resultant of any given system of forces acting at given points of a rigid body, Moment of a force about a line, equation of central axis, stable and unstable equilibrium, Poinso't's central axis, wrenches	9

Suggested Readings:

1. S.L. Loney : Statics, Cambridge University Press.
2. R.S. Verma : A Text Book on Statics, Jain Book Depot, Jaipur.
3. Bhargava, Agarwal, Gupta : Statics , JPH, Jaipur.
4. Gokhroo : Statics , Navkar Publications , Ajmer.
5. Bali : Statics , Laxmi Publication, New Delhi.

Syllabus for Bachelor of Science

III-Year (Semester-V)

Session 2021-22

Code	Description	Pd/W	Exam	CIA	ESE	Total
BSMT511	Metric and Vector Spaces	3	3 hrs	20	80	100
BSMT512	Complex Analysis	3	3 hrs	20	80	100
BSMT513	Hydrostatics	3	3 hrs	20	80	100
	Total			60	240	300

BSMT 511- METRIC AND VECTOR SPACES		
Unit-I	Ideals and Quotient Rings: Definition and properties, principle ideals and principle ideal ring, prime ideal, maximum ideal, Quotient ring, Polynomial over a ring.	9
Unit-II	Vector space: Definition with Examples, Sub-space, Linear combination of vectors, Linear Span	9
Unit-III	Linearly dependent and independent vectors and their simple properties, Bases and dimension	9
Unit-IV	Metric Space: Definition with examples, Bounded set, Open set, Closed sets, Neighborhoods Boundary points and limit points, Exterior point, Closure of a set, Metric Subspace	9
Unit-V	Continuous mappings, Sequence in a Metric Space, Cauchy Sequence, Subsequence, Completeness of Metric Space.	9

Suggested Readings:

- 1.K. C. Sarangi : Real Analysis and Metric Space, RBD, Jaipur.
2. Dr.Gokhroo and Dr. Gokhroo, Linear algebra, Navkar prakhasan, Ajmer.
- 3.P.B.Bhattacharya , S.K.Jain and S.R.Nagpaul, Basic Abstract Algebra , Cambridge University Press.
- 4.G. C. Sharma , Modern Algebra, Shivalal Agarwal & Co. Agra.
- 5.Deepak Chatterjee, Abstract Algebra. PHI. Ltd. New Delhi.
- 6.I.N.Herstein , Topics in Algebra , Wiley Eastern Ltd., New Delhi
- 7.Malcolm Birkoff , Abstract Algebra , Cambridge University Press

BSMT 512 - Complex Analysis		
Unit-I	Complex variable, complex function, Limit of a complex function, continuity and differentiability of complex function, Analytic function, Cauchy's Riemann (C-R) equations, Harmonic function.	9
Unit-II	Complex integration, Complex line integrals, Cauchy's integral theorem, Indefinite integral, Cauchy's integral formula.	9
Unit-III	Taylor's Theorem, Laurent's theorem, Singularities, Zero's and Pole of an analytic function, Types of singularities.	9
Unit-IV	Residue at a singularity, Cauchy's residue theorem, Evaluation of real definite integral by contour integration only $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$	9
Unit-V	Conformal Mapping, Necessary and sufficient conditions of a conformal mapping, elementary transformations, Bilinear transformation and its properties.	9

Suggested Readings:

1. Shanti Narayan: Theory of Functions of a Complex Variable, S.Chand and Co., New Delhi.
2. Gupta, K.P. : Complex Analysis, Pragati prakashan, Meerut.
3. Gokhroo, Saini & Yadav: Complex Analysis, Navkar prakashan, Ajmer.
4. G.N. Purohit: Complex Analysis, JPH, Jaipur.

BSMT 513- Hydrostatics		
Unit-I	Definition of Hydrostatics, Fluid Pressure, Equality of pressure in different directions, Transmissibility of Fluid Pressure (Pascal's law), Bramah's press, Weight in terms of Density and specific Gravity, Fluid at rest under gravity, Atmospheric Pressure, Difference of pressure between two points.	9
Unit-II	Fluid pressure on plane surfaces, whole pressure on a plane surface, whole pressure on a horizontal base, whole pressure on a plane surface below the layers of different liquids.	9
Unit-III	Centre of pressure, Position of centre of pressure of a plane area, depth of the centre of pressure of a plane surface, centre of pressure in some standard cases, centre of pressure of compound area, centre of pressure of the remainder area of a plane surface, Effect of Further immersion, depth of centre of pressure of a triangle, Determination of centre of pressure by integration, centre of pressure of area in more than one liquids.	9
Unit-IV	Resultant Thrust on curved surfaces, Resultant vertical thrust, resultant horizon thrust, Principle of Archimedes, Centre of Buoyancy, Thrust on a curved surface bounded by a Plane Curve.	9
Unit-V	Equilibrium of floating bodies, Equilibrium of a Body floating freely in two or more liquids, Stability of equilibrium of floating bodies, Meta centre.	9

Suggested Readings:

1. Sharma, Gokhroo, Saini, Agarwal.: Elements of Hydrostatics, Navkar publications, Ajmer
2. Prasad, B.N. : Hydrostatics, Allahabad, Kitab Mahal, Allahabad.
3. Mathur, S.M. : A Text Book of Hydrostatics, Atma Ram and Sons Publishers and Book Sellers, Delhi.

Syllabus for Bachelor of Science

III-Year (Semester-VI)

Session 2021-2022

Code	Description	Pd/W	Exam	CIA	ESE	Practical	Total
BSMT611	Discrete Mathematics	3	3 hrs	20	80	-	100
BSMT612	Real Analysis	3	3 hrs	20	80	-	100
BSMT613	Computer Oriented Numerical Analysis	3	3 hrs	20	50	30	100
	Total			60	210	30	300

BSMT611 - DISCRETE MATHEMATICS		
Unit-I	Counting and Recursion: Principle of Inclusion & Exclusion, Pigeonhole Principle, Mathematical induction, Recurrence relation, Generating Functions.	9
Unit-II	Relation & Diagraphs: Product sets & Partitions, Relations & diagraphs, paths in relation & Diagraphs, properties of relations, Equivalence relations, computer representation of relations& diagraphs, manipulation of relations. Logic and propositions: Tautology and contradiction and related problems.	9
Unit-III	Ordered Relations & Structures: Partially ordered sets, external elements of partially ordered sets, Bounding Elements, Well Ordered Set, Lattices, Principle of Duality, Bounded, Distributed, and Complemented Lattices, Boolean algebra, functions on Boolean algebra.	9
Unit-IV	Graphs Theory: Basic Terminology, types of graph, paths & cycles, Euler graph & cycles, Hamiltonian graph & cycles, shortest path algorithm (Djikstras algorithm), Graph Isomorphism, Planar Graph,	9
Unit-V	Trees: Introduction, labeled trees, m-ary trees, undirected trees, properties of tree, Spanning tree, Minimal spanning tree, Binary search trees.	9

Suggested Readings:

1. Bernard Kolmann, Robert C. Busby and Sharon Ross, "Discrete Mathematical Structures", PHI.
2. C.L.Liu, Elements of Discrete Mathematics, McGraw-Hill Book Company.
3. V. K. Balakrishnan, Introductory discrete mathematics, Prentice Hall, .
4. Richard Johnsonbaugh, Discrete Mathematics, Pearson Education.
5. Norman Biggs, Discrete mathematics, Oxford University Press.
6. Kenneth H. Rosen, "Discrete Mathematics and its Applications, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
7. Pandey and Garg: Discrete Mathematics, JPH, Jaipur
8. U.S. Gupta "Discrete Mathematical Structures" , Pearson Education, Delhi

BSMT612 Real Analysis		
Unit-I	Introduction of Real number system, Peano's Axioms, Field, Field properties, Order, order field, order properties, upper bound, least upper bound, Lower bound, greatest lower bound, completeness, complete ordered field, Archimedean properties of real number, Archimedean properties of order field,	9
Unit-II	Intervals, Nested Interval Theorem, Neighborhood (nbd) of a point, some theorems on neighborhood, Limit point of a set, Isolated Point, Bolzano Weierstrass (B-W) Theorem, Open and Closed sets, Theorem on open and closed sets, Compactness, Heine Borel (H-B) Theorem, Count ability of sets, Theorem on countable set.	9
Unit-III	Definition of Function, Monotonic function, Limit of a function of one variable at a point, Epsilon-delta (ϵ - δ) theorem, Limit of functions of two variables, algebra of limits. Cauchy's definition of continuity, classification of discontinuity, Heine's definition of continuity, Types of discontinuity	9
Unit-IV	Borel's covering theorems, Moistest theorem, Bolzano's theorem, Intermediate value theorem. Definition of differentiability, Algebra of derivatives, Properties of derivative, Darboux intermediate value theorem, Differentiability of functions of two variables.	9
Unit-V	Riemann Integration: Theorems of Darboux sums, Upper and lower Riemann integral, Riemann integral, Function of R-Intgrable Functions, Fundamental theorem of Integral calculus, Mean value theorems.	9

Suggested Readings:

1. Shanti Narayan: Real Analysis, S.Chand And Company , Merrut.
2. G.N.Purohit: Real Analysis, JPH, Jaipur.
3. Bhargava, Goyal: Real Analysis, JPH, Jaipur.
4. Gokhroo, Saini, Ozgha: Real Analysis, Navkar Publications, Ajmer.

**Teaching : 3 Periods (40 minutes each) per week for Theory Paper
4 Periods (60 minutes each) per week for Practical.**

**Theory Paper 3 hours duration Max
Practical Examination 3 hours duration Max.**

**Marks : 50
Marks : 30**

BSMT613 Computer Oriented Numerical Analysis		
Unit-I	Significant digits, floating point representation of numerals, arithmetic operations with normalized floating point number—addition, subtraction, multiplication and division, errors in numerical computation. Pitfalls in computing.	9
Unit-II	Method of successive approximations: Concepts of roots by synthetic division, value and values of derivative of a polynomial by synthetic division, Bairstow's method..	9
Unit-III	Solution of ordinary differential equations - Taylor's method, Euler's method, Runge Kutta second and fourth order method, Picard's method, modified Euler's method.	9
Unit-IV	Solution of simultaneous linear equation: Gauss elimination method, Pivoting, ill conditioned equations, Refinement of solution, Gauss Seidal iterative method. Curve fitting - Method of least squares, fitting of straight lines, polynomials, exponential curves.	9
Unit-V	Definitions of Algorithm and flowchart, Introduction to c-Language, Constant and variables, structure of C-program, operators, looping statements, Array and Strings	9

Suggested Readings:

1. Computer Oriented Numerical & Statistical Techniques ,R. Singh,I. Singh, Khanna Publication Co., New delhi.
2. Computer Oriented Numerical Methods, V Rajaraman, Prentice Hall India
3. Calculus of Finite Differential & Numerical Analysis, Gupta & Malik, Krishna Prakashan Media (P) Ltd, Meerut
4. Computer Oriented Numerical Methods, R S Salaria, Khanna Publication
5. Computer Oriented Numerical Methods, P Thangaraj, PHI Publication
6. The Complete Reference C, Herbert Schildt, TMH
7. Let Us C, Yashavant P. Kanetkar , BPB Publications
8. Programming in ANSIC, Balaguruswamy, Mc Graw Hill

PRACTICAL

Distribution of Marks:

Two practical (10 marks each) : 20 Marks

Practical Record: 05 Marks

Viva-voce: 05 Marks

Total : 30 Marks

Programming in C of the following problems:

- (1) Solution of linear algebraic equations
 - A) Gauss elimination
 - B) Jacobi-Iteration method.

- (2) Solution of algebraic and transcendental equations by
 - A) Bisection methods
 - B) Regula False position method
 - C) Newton-Raphson
 - D) Iteration methods.

- (3) Numerical solution of ordinary Differential Equation by
 - A) Euler's methods
 - B) Runge-Kutta Methods.

- (4) Numerical Integration by
 - A) Trapezoidal Rule
 - B) Simpson's Rule
 - C) Simpson's three eight rule.

1. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed as per University rules and internal examiner will be appointed by the Head of the Department.
2. Each candidate has to prepare his/her practical record.
3. Each candidate has to pass in Theory and Practical examinations separately.

Syllabus for B.Pharma215 (I-year, II Semester)

Session 2019-20

Mathematics and Statistical Techniques

Unit-I	Differentiation: Functions , limits and derivative of a function, Basic theorems on differentiation, differentiation of trigonometric functions, inverse trigonometry functions and logarithmic functions. Integrations : Integration by standard formula, Integration by substitution, integration by parts, Integration of algebraic functions (simple problems)	10
Unit-II	Differential equations : Formation, order and degree of a differential equation, Differential equation of first order and first degree(Variable separable form, Homogeneous form, linear form and reducible to linear form)	10
Unit-III	Linear programming problems : Solution of linear programming problems by graphical method and simplex method Transportations and Assignment problems, Theory of games	10
Unit-IV	Statistical Techniques: Basic concept of statistics, data, data graphics, frequency distribution, Measure of central tendency (Mean, median, mode,, harmonic mean, geometric mean), scattering data (range, mean, deviation, standard deviation, etc.), Tables and graph 'Life tables' only.	10
Unit-V	Correlation and regression: Correlation analysis, Karl Pearson's correlation coefficient, Regression equations, Linear and curvilinear correlation, Spearman's rank correlation coefficient.	10
Unit-VI	Sampling : Introduction to probability, Probability samples, Introduction of sampling distribution, confidence intervals, computing 99% and 95% fiducial limits from tables of areas and ordinates of normal curve 'Z' score computing 't' test and analysis of variance. (All calculation should be illustrated with examples from true laboratory pharmacological experiments.)	10

Suggested Readings:

1. N.C.E.R.T. books for Differentiation and integration.
2. Differential equations of Bansal, Bhargav and Agarwal, JPH
3. Fundamental of mathematical statistics of Gupta and Kapoor, S. Chand and sons
4. Gokharoo, D.C. and Saini, S.R.: Mathematical Statistics (Hindi ed.), Navkar Prakashan, Ajmer.
5. Bhargava, S.L. and Agarwal, S.M., Mathematical Statistics, Jaipur Publishing House, Jaipur.

Syllabus for BCA-114 (I-year, I Semester)

Session 2019-2020

MATHEMATICS-I		
Unit-I	Sets:-definition of sets, Representation of sets, Type of sets i.e. empty set, equal set, finite and infinite set, subset, power set, universal set, operations on sets, intersection of sets, properties of operation on sets, complement of a set, properties of complement of set.	9
Unit-II	Matrix:- Definition of matrix, Types of matrixes i.e. Row matrix, column matrix, equal matrix, square matrix, Diagonal matrix, Scalar matrix etc., operation on matrixes i.e. addition, subtraction and product of matrixes. Determinant:- Definition of determinants, expansion of determinants, operation on determinants, minors, cofactor, singular and non-singular matrix, Ad joint of matrix, Inverse of a matrix.	9
Unit-III	Quadratic equations:-Definition of quadratic equation, solution of quadratic equation by factorization method and shridharacharya's formula, Sequence & series: Introduction, Arithmetic progression (AP), General term of a AP , sum of n terms of a AP, Arithmetic mean, Geometric progression (GP), general term of G.P., Sum of a G.P., Geometrical mean.	9
Unit-IV	Trigonometry:- Angles, Degree measures, radian measures, Relation between radian and real number, Relation between degree and radian, trigonometric functions and identities, sign of trigonometric functions, sum and Difference of two angles of trigonometric functions.	9
Unit-V	Coordinate Geometry: The number plane, distance formula, area of a triangle, section formula, slope of a line, equation of a straight line: introduction, point form, slope form, two point form, intercept form, normal form, distance of a point from a line, distance between two parallel lines, angle between two lines only in two dimensions.	9

Suggested Readings:

1. Kapoor & Gupta :Matrices and Determinants
2. NCERT mathematics book
3. Jat et all : Basic Mathematics for BCA, JPH (2015), Jaipur.

Syllabus for BCA-214 (I-year, II Semester)

Session 2019-2020

MATHEMATICS-II		
Unit-I	Limits:-Definition of limit of a Function, Right hand limit(RHL), Left hand limit(LHL), evaluation of limits of a function by method of factors, method of substitution. Continuity:- Definition of continuity, continuity of function at a point Differentiability: differentiability of function at a point.	9
Unit-II	Standard formulae of derivatives, differentiation of product and quotient of two functions, Differentiation of a function of a function, logarithmic differentiation, differentiation of implicit and parametric functions.	9
Unit-III	Maclaurins theorem, expansion of some standard functions i.e. e^x , $\sin x$, $\cos x$ etc., Taylor's theorem and simple problems, Maxima and minima of functions of one variables and simple problems based on it.	9
Unit-IV	Integrations: Integration by standard formula, Integration by substitution,	9
Unit-V	Integration by parts, Integration of Rational Algebraic functions.	9

Suggested Readings:

1. NCERT mathematics book
2. Jat et all : Basic Mathematics for BCA, JPH (2015), Jaipur.