Bachelor of Science

Mathematics

Syllabus

Faculty of Science

MAULANA AZAD UNIVERSITY, JODHPUR

B.Sc. Semester-I

Schemes for Internal Assessments and End Semester Examinations Semester-wise

Course	Subject	Code	Paper	CIA-I	CIA-II	ESE	Total
ELECTIVE COURSES	**Botany**	BSBO 111	Algae, Lichens and Bryophytes	10	10	80	100
		BSBO 112	Mycology, Microbiology and Phytopathology	10	10	80	100
		BSBO 121	**Botany Lab-I**	10	10	80	100
	Chemistry	BSCH 111	Inorganic Chemistry-I	10	10	80	100
		BSCH 112	Organic Chemistry-I	10	10	80	100
		BSCH 121	**Laboratory Course-I**	10	10	80	100
	Mathematics	BSMT 111	Algebra	10	10	80	100
		BSMT 112	Differential Calculus	10	10	80	100
		BSMT 113	Co-Ordinate Geometry in 2-Dimensions and 3-Dimensions	10	10	80	100
	Physics	BSPH 111	Mechanics	10	10	80	100
		BSPH 112	Electromagnetics	10	10	80	100
		BSPH 121	**Physics Lab-I**	10	10	80	100
	Zoology	BSZO 111	Taxonomy of Lower Non Chordate	10	10	80	100
		BSZO 112	Cytology and Genetics-I	10	10	80	100
		BSZO 121	**Zoology Lab-I**	10	10	80	100
	Public Health	PHLT 111	Human Biology	10	10	80	100
		PHLT 112	Introduction to Public Health	10	10	80	100
		PHLT 121	**Human Biology and First Aid Lab**	10	10	80	100
Core Courses	**Compulsory Paper**	**BHN 131**	**General Hindi**	**10**	**10**	**80**	**100***
		BEN 131	**General English**	**10**	**10**	**80**	**100***

B.Sc. Semester-II

Schemes for Internal Assessments and End Semester Examinations Semester-wise

Course	Subject	Code	Paper	CIA-I	CIA-II	ESE	Total
ELECTIVE COURSES	**Botany**	BSBO 211	Pteridophytes	10	10	80	100
		BSBO 212	Gymnosperms and Palaeobotany	10	10	80	100
		BSBO 221	**Botany Lab-II**	10	10	80	100
	Chemistry	BSCH 211	Physical Chemistry-I	10	10	80	100
		BSCH 212	Organic Chemistry-II	10	10	80	100
		BSCH 221	**Laboratory course-II**	10	10	80	100
	Mathematics	BSMT 211	Differential Equations	10	10	80	100
		BSMT 212	Integral and Vector Calculus	10	10	80	100
		BSMT 213	Co-ordinate Geometry in 3-Dimensions	10	10	80	100
	Physics	BSPH 211	Optics	10	10	80	100
		BSPH 212	Waves and Oscillations	10	10	80	100
		BSPH 221	**Physics Lab-II**	10	10	80	100
	Zoology	BSZO 211	Evolution and Biology of Higher Non Chordate	10	10	80	100
		BSZO 212	Molecular Biology and Genetics II	10	10	80	100
		BSZO 221	**Zoology Lab-II**	10	10	80	100
	Public Health	PHLT 211	Epidemiology	10	10	80	100
		PHLT 212	Biostatistics and Computer Applications	10	10	80	100
		PHLT 221	**Epidemiology and Biostatistics Lab**	10	10	80	100
Core Courses	**Compulsory Paper**	**BES 231**	**Environmental Studies**	**10**	**10**	**80**	**100***

B.Sc. Semester-III

Schemes for Internal Assessments and End Semester Examinations Semester-wise

Course	Subject	Code	Paper	CIA-I	CIA-II	ESE	Total
ELECTIVE COURSES	**Botany**	BSBO 311	Anatomy of Angiosperms, Economic Botany and Ethnobotany	10	10	80	100
		BSBO 312	Cell and Molecular Biology	10	10	80	100
		BSBO 321	**Botany Lab-III**	10	10	80	100
	Chemistry	BSCH 311	Inorganic Chemistry-II	10	10	80	100
		BSCH 312	Physical Chemistry-II	10	10	80	100
		BSCH 321	**Laboratory Course-III**	10	10	80	100
	Mathematics	BSMT 311	Partial Differential Equation and Laplace Transform	10	10	80	100
		BSMT 312	Numerical Analysis	10	10	80	100
		BSMT 313	Dynamics of a Particle	10	10	80	100
	Physics	BSPH 311	Statistical and Thermal Physics	10	10	80	100
		BSPH 312	Electronic Devices and Circuits	10	10	80	100
		BSPH 321	**Physics Lab-III**	10	10	80	100
	Zoology	BSZO 311	Biology of Chordates	10	10	80	100
		BSZO 312	Immunology & Microbiology	10	10	80	100
		BSZO 321	**Zoology Lab-III**	10	10	80	100
	Public Health	PHLT 311	Determination of Health and Disease	10	10	80	100
		PHLT 312	Essentials of Demography	10	10	80	100
		PHLT 321	**Demography Lab.**	10	10	80	100

B.Sc. Semester-IV

Schemes for Internal Assessments and End Semester Examinations Semester-wise

Course	Subject	Code	Paper	CIA-I	CIA-II	ESE	Total
ELECTIVE COURSES	**Botany**	BSBO 411	Taxonomy and Embryology of Angiosperms	10	10	80	100
		BSBO 412	Cytogenetics, Genetics, Plant Breeding, Evolution and Biostatistics	10	10	80	100
		BSBO 421	**Botany Lab-IV**	10	10	80	100
	Chemistry	BSCH 411	Inorganic Chemistry-III	10	10	80	100
		BSCH 412	Organic Chemistry-III	10	10	80	100
		BSCH 421	**Laboratory Course-IV**	10	10	80	100
	Mathematics	BSMT 411	Optimization Techniques	10	10	80	100
		BSMT 412	Abstract Algebra	10	10	80	100
		BSMT 413	Statics	10	10	80	100
	Physics	BSPH 411	Electrodynamics	10	10	80	100
		BSPH 412	Quantum Mechanics	10	10	80	100
		BSPH 421	**Physics Lab-IV**	10	10	80	100
	Zoology	BSZO 411	Comparative Anatomy of Chordates	10	10	80	100
		BSZO 412	Animal Embryology	10	10	80	100
		BSZO 421	**Zoology Lab-IV**	10	10	80	100
	Public Health	PHLT 411	Fundamentals of Epidemiology	10	10	80	100
		PHLT 412	Biostatistics And Research Methods	10	10	80	100
		PHLT 421	**Epidemiology and Biostatstics Lab**	10	10	80	100

B.Sc. Semester-V

Schemes for Internal Assessments and End Semester Examinations Semester-wise

Course	Subject	Code	Paper	CIA-I	CIA-II	ESE	Total
ELECTIVE COURSES	**Botany**	BSBO 511	Plant Physiology and Biochemistry	10	10	80	100
		BSBO 512	Plant Tissue Culture	10	10	80	100
		BSBO 521	**Botany Lab-V**	10	10	80	100
	Chemistry	BSCH 511	Organic Chemistry-IV	10	10	80	100
		BSCH 512	Physical Chemistry-III	10	10	80	100
		BSCH 521	**Laboratory Course-V**	10	10	80	100
	Mathematics	BSMT 511	Metric and Vector Spaces	10	10	80	100
		BSMT 512	Complex Analysis	10	10	80	100
		BSMT 513	Hydrostatics	10	10	80	100
	Physics	BSPH 511	Atomic and Molecular Spectroscopy and Laser Physics	10	10	80	100
		BSPH 512	Solid State Physics	10	10	80	100
		BSPH 521	**Physics Lab-V**	10	10	80	100
	Zoology	BSZO 511	Animal Physiology	10	10	80	100
		BSZO 512	Ecology	10	10	80	100
		BSZO 521	**Zoology Lab-V**	10	10	80	100
	Public Health	PHLT 511	Epidemiology of Communicable and Non Communicable Diseases	10	10	80	100
		PHLT 512	Health Care Systems	10	10	80	100
		PHLT 521	**Health Care System Lab**	10	10	80	100

B.Sc. Semester-VI

Schemes for Internal Assessments and End Semester Examinations Semester-wise

Course	Subject	Code	Paper	CIA-I	CIA-II	ESE	Total
ELECTIVE COURSES	**Botany**	BSBO 611	Ecology and Environmental Biology	10	10	80	100
		BSBO 612	Recombinant DNA Technology	10	10	80	100
		BSBO 621	**Botany Lab-VI**	10	10	80	100
	Chemistry	BSCH 611	Inorganic Chemistry-IV	10	10	80	100
		BSCH 612	Physical Chemistry-IV	10	10	80	100
		BSCH 621	**Laboratory Course-VI**	10	10	80	100
	Mathematics	BSMT 611	Discrete Mathematics	10	10	80	100
		BSMT 612	Real Analysis	10	10	80	100
		BSMT 613	Computer Oriented Numerical Analysis	10	10	80	100
	Physics	BSPH 611	Nuclear Physics	10	10	80	100
		BSPH 612	Analog and Digital Electronics	10	10	80	100
		BSPH 621	**Physics Lab-VI**	10	10	80	100
	Zoology	BSZO 611	Biodiversity and Ethology	10	10	80	100
		BSZO 612	Applied Zoology	10	10	80	100
		BSZO 621	**Zoology Lab-VI**	10	10	80	100
	Public Health	PHLT 611	Health Education and Health Promotion and Communication	10	10	80	100
		PHLT 612	Global Health	10	10	80	100
		PHLT 621	**Field Project**	10	10	80	100

B.Sc. Mathematics

Schemes for Internal Assessments and End Semester Examinations Semester-wise

Semester	Subject	Code	Paper	CIA-I	CIA-II	ESE	Total
I Sem.	**Core Subjects**	BSMT 111	Algebra	10	10	80	100
		BSMT 112	Differential Calculus	10	10	80	100
		BSMT 113	Co-ordinate Geometry in 2-Dimensions and 3- Dimensions	10	10	80	100
	Compulsory Paper	**BHN131/ BEN131**	**Samanya Hindi/ General English**	**10**	**10**	**80**	**100***
II Sem.	**Core Subjects**	BSMT 211	Differential Equations	10	10	80	100
		BSMT 212	Integral and Vector Calculus	10	10	80	100
		BSMT 213	Co-ordinate Geometry in 3-Dimensions	10	10	80	100
	Compulsory Paper	**BES 231**	**Environmental Studies**	**10**	**10**	**80**	**100***
III Sem.	**Core Subjects**	BSMT 311	Partial Differential Equation and Laplace Transform	10	10	80	100
		BSMT 312	Numerical Analysis	10	10	80	100
		BSMT 313	Dynamics of a Particle	10	10	80	100
IV Sem.	**Core Subjects**	BSMT 411	Optimization Techniques	10	10	80	100
		BSMT 412	Abstract Algebra	10	10	80	100
		BSMT 413	Statics	10	10	80	100
V Sem.	**Core Subjects**	BSMT 511	Metric and Vector Spaces	10	10	80	100
		BSMT 512	Complex Analysis	10	10	80	100
		BSMT 513	Hydrostatics	10	10	80	100
VI Sem.	**Core Subjects**	BSMT 611	Discrete Mathematics	10	10	80	100
		BSMT 612	Real Analysis	10	10	80	100
		BSMT 613	Computer Oriented Numerical Analysis	10	10	80	100

Semester-I		
BSMT 111: Algebra		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Matrix: The characteristic equation of matrix: Eigen Values and Eigen Vectors, Cayley-Hamilton theorem, its use in finding the inverse of a Matrix. 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.	09
II	Relations: Equivalence and partial order relations. Definition of a group with examples and simple properties. Order of an element in a group and its properties.	09
III	Definition and properties of permutation group, cyclic group and sub group.	09
IV	Infinite series: Convergent series, convergence of geometric series, And necessary condition for the convergent series, comparison tests: Cauchy root test.	09
V	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.	09

RECOMMENDED READINGS

- Algebra: Bansal, Bhargav, Agarwal, Jaipur publishing House
- Modern Algebra's : Vashistha
- Abstract Algebra/;Bansal, Bhargav, Agarwal
- Gokhroo. Gokhroo: Abstract Algebra (Eng Ed)

Semester-I		
BSMT 112: Differential Calculus		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
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.	09
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.	09
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 curves, parametric equations, polar curve.	09
V	Envelopes: Envelope of family of curve having one parameter and also of two parameters, related by a relation, Evolutes, Mean value theorem (Statements, Geometrical interpretations and verifications only).	09

RECOMMENDED READINGS

- Differential calculus II, Bansal. Bhargav and Agarwal (JPH)
- A Text Book of Differential Calculus II, Gokhroo, Saini
- Gupta, juneja and Tandon (English Ed)

Semester-I		
BSMT 113: Co-ordinate Geometry in 2-Dimensions and 3- Dimensions		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Ellipse: Standard equation, Tangent, Normal, Chord of contact, Pole Polar and their properties, Diameter and conjugate diameters. Hyperbola: standard equation, Tangent, Normal, Pole and Polar, Asymptotes, Rectangular Hyperbola, auxiliary circle, director circle.	09
II	General equation of second degree, Nature of conic, tracing of conics.	09
III	Polar equations, Polar equations of a conic, polar equation of tangents, perpendicular lines and normal, director circle of conic and related simple problems.	09
IV	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 line & Tangent line of sphere, pole and polar plane, properties of poles and polars.	09
V	Cone: Definition of cone, equation of cone, enveloping cone condition of tangency, reciprocal cone and right circular cone. Cylinder: definition of cylinder, enveloping cylinder, equation of enveloping cylinder, right circular cylinder.	09

RECOMMENDED READINGS

- 2-D Co-ordinate Geometry A. Bansal and Bhargav B. Gokhroo and Saini & Ojha
- Co-ordinate geometry, Sharma and Varshney

Semester-II		
BSMT 211: Differential Equations		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Degree and order of a differential equation, equation of first order and first degree. Equation in which the variables are separable, Homogeneous equations, linear equations. Differential equations reducible to linear equations, exact differential equations and reducible to exact differential equations.	09
II	First order and higher degree differential equations solvable for x, y, p. Clairaut's form and singular solutions, linear differential equation with constan coefficients.	09
III	Homogeneous linear differential equation with variable coefficients and the equation reducible to homogeneous form. Total differential equaction of the form Pdx+Qdy+Rdz=0 by the method of inspection and method of homogeneous equation.	09
IV	Simultaneous differential equations and also of the type dx/P=dy/Q=dz/R, exact differential equations of higher order and the differential equations reducible to exact form.	09
V	Second order linear differential equations: Normal form, solution of equations when one part of C.F. is known change of independent variables, Variation of parameters.	09

RECOMMENDED READINGS

- Differential Equation, A. Bansal, Bhargav and Agarwal B. Gokhroo, Saini and Bhati
- Differential Equation, Bansal and Dhami

Semester-II		
BSMT 212: Integral and Vector Calculus		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Beeta and gamma functions: properties and problem based on it. Rectification, differentiation under the sign of integration.	09
II	Quadrature, Volume and surface of solid of revolution.	09
III	Evaluation of double and triple integration in Cartesian and polar co-ordinates, Change from Cartesian to polar form, change of order of integration, Dirichlet's integral.	09
IV	Scalar and vector point functions, Vector differentiation, directional derivatives, Gradient, Divergence and curl, identities involving these operators and related problems.	09
V	Vector integration: Gauss divergence theorem, stoke's theorem, Green's theorem (without proof of each theorem) and their applications.	09

RECOMMENDED READINGS

- A Text bok of Integral calculus II (Hindi Ed)
- Vector calculus, A Bansal, Bhargav and Agarwal B. Gokhroo, Saini and Bhati

Semester-II		
BSMT 213: Co-ordinate Geometry in 3-Dimensions		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Central conicoid, tangent line 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.	09
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 Diameteral plane, conjugate semi diameter plane, conjugate semi diameters.	09
III	Paraboloid, Intersection of a line and a parabolid, condition of tangency, important standard results, equation of normal's, Normal to a paraboloidfrom a given point, cubic curve through the feet of normal's, cone through the five normals.	09
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, Umiblics of ellipsoid and paraboloid.	09
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.	09

RECOMMENDED READINGS

- 2-D Co-ordinate Geometry A. Bansal and Bhargav B. Gokhroo and Saini & Ojha.
- Co-ordinate geometry, Sharma and Varshney.

Semester-III		
BSMT 311: Partial Differential Equation and Laplace Transform		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Partial differential equation: 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).	09
II	Solution of non linear partial differential equation of the form f(p,q)=0, f(z,p,q)=0 and f1(x,p)=f2(p,q) Charpit's method.	09
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.	09
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.	09
V	Application of Laplace transform: Solution of ordinary differential equations with constant and variable coefficients, solution of simultaneous ordinary differential equations.	09

RECOMMENDED READINGS

- Gokhroo, Saini, Ojha : Partial differential equations.
- Partial differential equation by M.D.Raishinghania
- Laplace and fourier transform by Goyal & gupta

Semester-III		
BSMT 312: Numerical Analysis		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
II	Interpolation with unequal intervals, Lagrange's interpolation formula, divided differences, properties of divided differences, Newton's divided differences formula for unequal intervals.	09
III	Central difference interpolation: Sheppard's central difference operators, relation between operators E, Δ, ∇ , □, and □. Gauss's forward, backward and central interpolation formula, Sterling's interpolation formula for central difference, Bessel's interpolation formula.	09
IV	Numerical differentiation, Numerical integrations by Trapezoidal rule, Simpson's 1/3, 3/8 rule and Weddle's rule.	09
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.	09

RECOMMENDED READINGS

- Goyal, Mittal : Numerical Analysis, Prograti Prakashan
- Bansal, Bhargava : Numerical Analysis (Hindi Ed.)
- Saxena, H.C. : Numerical Analaysis
- Gokhroo : Numerical Analysis (Hindi Ed.)

Semester-III		
BSMT 313: Dynamics of a Particle		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Kinematics: Radial and transverse velocities and accelerations. Angular velocity and acceleration, Tangential and normal velocities and acceleration.	09
II	Simple Harmonic motion, Hook's law, Motion of a particle attached to horizontal and vertical elastic strings.	09
III	Motion in a plane under variable forces, Inverse square law of motion, Motion in aresisting medium (resistance varies as a velocity and square of the velocity).	09
IV	Circular and Cycloidal motion of a Particle on smooth and rough vertical plane curve.	09
V	Central orbits , Apse, time in orbit, Kepler's laws of planetary motion.	09

RECOMMENDED READINGS

- S.L. Loney : Dynamics of a particle & Rigid bodies.
- Ray, M : A Text book on Dynamics.
- Gokhroo, Saini & Yadav : Higher Dynamics II (Hindi Ed.)
- Bhargava, Agarwal : Dynamics (Hindi Ed.)

Semester-IV		
BSMT 411: Optimization Techniques		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
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.	09
III	Artificial Variables, Big-M and Two Phase method to solve a linear programming problem.	09
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.	09
V	Assignment and Transportation problems and their optimum solutions.	09

RECOMMENDED READINGS

- Gokhroo, Saini : Linear Programming (Hindi Ed.)
- Mittal, Sethi : Linear Programming, Pragati Prakashan
- Bhargava, Sharma, Bhati : Linear programming (Hindi Ed.)

Semester-IV		
BSMT 412: Abstract Algebra		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Coset decomposition, index of a subgroup, Lagrange's theorem and its consequences. Fermat's and Euler's theorems.	09
II	Normal subgroup with properties, simple subgroups, quotient groups, group homomorphism, its kernel and properties, Isomorphism, fundamental theorem of homomorphism.	09
III	**Rings**: Definition and kinds of rings, integral domain, division ring, sub ring, ring homomorphism and ring isomorphism.	09
IV	**Field**: Definition and properties, sub field, prime field, imbedding of an integral domain in a field, field of quotients.	09
V	**Ideals**: Definition and properties, principle ideals and principle ideal ring, prime ideal, maximum ideal, Polynomial over a ring, integral domain and field, Division algorithm.	09

RECOMMENDED READINGS

- Sharma, G.C. : Modern Algebra
- Bansal & Bhargava : Abstract Algebra (Hindi Ed.)
- Agarwal, R.S. : Text Book on Modern Algebra
- Gokhroo & Saini : Abstract Algebra (Hindi Ed.)

Semester-IV		
BSMT 413: Statics		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
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.	09
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.	09
IV	Common catenary: Definition and equation of comman catenary(Intrinsic, Cartesian), Shape of the common catenary, Approximation of the common catenary.	09
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, Poinsot's central axis, wrenches.	09

RECOMMENDED READINGS

- S.L. Ioney : Statics
- R.S. Verma : A Text Book on Statics
- Bhargava, Agarwal, Gupta : Statics (Hindi Ed.)
- Gokhroo : Statics (Hindi Ed.).

Semester-V		
BSMT 511: Metric and Vector Spaces		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
II	Vector space: Definition with Examples, Sub-space, Linear combination of vectors,Linear Span.	09
III	Linearly dependent and independent vectors and their simple properties, Bases and dimension.	09
IV	Metric Space: Definition with examples, Bounded set, Open set, Closed sets, NeighborhoodsBoundary points and limit points, Exterior point, Closure of a set, Metric Subspace.	09
V	Continuous mappings, Sequence in a MetricSpace, CauchySequence, Subsequence, Completeness of Metric Space.	09

RECOMMENDED READINGS

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

Semester-V		
BSMT 512: Complex Analysis		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
II	Complex integration, Complex line integrals, Cauchy's integral theorem, Indefinite integral, Cauchy'sintegral formula.	09
III	Taylor's Theorem, Laurent's theorem, Singularities, Zero's and Pole of an analytic function, Types of singularities.	09
IV	Residue at a singularity, Cauchy's residue theorem, Evaluation of real definite integral by contour integration only.	09
V	Conformal Mapping, Necessary and sufficient conditions of a conformal mapping, elementary transformations, Bilinear transformation and its properties.	09

RECOMMENDED READINGS

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

Semester-V		
BSMT 513: Hydrostatics		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
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.	09
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.	09
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.	09
V	Equilibrium of floating bodies, Equilibrium of a Body floating freely in two or more liquids, Stability of equilibrium of floating bodies, Meta centre.	09

RECOMMENDED READINGS

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

Semester-VI		
BSMT 611: Discrete Mathematics		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ Unit**
I	Counting and Recursion: Permutations and Combinations, Principle of Inclusion & Exclusion, Pigeonhole Principle, Mathematical induction, Recurrence relation, Generating Functions.	09
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.	09
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.	09
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, Graph colouring and chromatic number.	09
V	Trees: Introduction, labeled trees, m-ary trees, undirected trees, properties of tree, Spanning tree, Minimal spanning tree, Binary search trees.	09

RECOMMENDED READINGS

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

Semester-VI		
BSMT 612: Real Analysis		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
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.	09
III	Definition of Function, Monotonic function, Limit of a function of one variable at a point, Epsilon-delta (€-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.	09
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.	09
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.	09

RECOMMENDED READINGS

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

Semester-VI		
BSMT 613: Computer Oriented Numerical Analysis		**45 Hrs**
इकाई Unit	**पाठ्यक्रम सामग्री Course Content**	**Hours/ 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.	09
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.	09
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.	09
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.	09
V	Definitions of Algorithm and flowchart, Introduction to c-Language, Constant and variables, structure of C-program, operators, looping statements, Arrayand Strings.	09

RECOMMENDED READINGS

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