GUJRANWALA GURU NANAK KHALSA COLLEGE, CIVIL LINES, LUDHIANA

AFFILIATED TO PANJAB UNIVERSITY, CHANDIGARH

Academic Calendar for the session 2019-20 with Under Graduate & Post Graduate Mathematics Course having Semester System of examination:-

SummerVacation	**31-05-19**	**To**	**07-07-19**	**(38 days)**
	Friday		**Sunday**	

Academic Calendar

Colleges Open on and normal Admission for on-going Classes	**08-07-19 Monday**			

Admission Shedule

Admission Process	**08-07-19 Monday**	**To**	**13-07-19 Saturday**	**(06 days)**
Normal Admission for New classes (except for those Classes in which admission is	**15-07-19 Monday**	**To**	**27-07-19 Saturday**	**(12 days)**
Late Admission for, ongoing Classes and new classes) to be allowed by the Principal of the College with late fee of Rs.**560/**- per student.	**29-07-19 Monday**	**To**	**13-08-19 Tuesday**	**(16 days)**

Commencement of Teaching

Admission for classes through CET tentative	**Schedule to be provided by Dean Faculty of Science**			
For new admission classes (those admitted through PU-CET (P.G) tentative	**As per CET**			
Late admission in Panjab University, affiliated Colleges to be allowed by the Vice-Chancellor with fee of Rs. 2040/-per student	**14-08-19 Wednesday**	**To**	**31-08-19 Saturday**	**(18 days)**
Academic Term –I	**08-07-19**	**To**	**29-11-19**	**(97 teaching days)**
Ist,3rd,Vth	**Monday**		**Friday**	

Total teaching days of Academic Term I = 97 Days

BACHELOR OF SCIENCE Session 2019-2020 (First Semester)

Sr.no	Teacher	Class	Paper	Month-week			Syllabus
1	Prof. Gurvinder Kaur	B.Sc.-I	Paper –I Plane geometry Paper –III Trigonometry and matrices	**July**	**3rd**	Transformation of axes in two dimensions: Shifting of origin, rotation of axes, invariants	**PLANE GEOMETRY** **Unit-I** Transformation of axes in two dimensions: Shifting of origin, rotation of axes, invariants. Pair of Straight Lines : Joint equation of pair of straight lines and angle between them, Condition of parallelism and perpendicularity, Joint equation of the angle bisectors, Joint equation of lines joining origin to the intersection of a line and a curve. Circle : General equation of circle, Circle through intersection of two lines, tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of mid-point, angle of intersection and orthogonality, power of a point w.r.t. circle, radical axis, co-axial family of circles, limiting points.
					4th	Pair of Straight Lines : Joint equation of pair of straight lines and angle between them, Condition of parallelism and perpendicularity	
				Aug	**1st**	Joint equation of lines joining origin to the intersection of a line and a curve. Circle : General equation of circle	
					2nd	Circle through intersection of two lines, tangents, normals, chord of contact, pole and polar, pair of tangents from a point,	
					3rd	equation of chord in terms of mid-point, angle of intersection and orthogonality, power of a point w.r.t. circle, radical axis, co-axial family of circles, limiting points	
					4th	Conic : General equation of a conic, tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of	

						mid-point	**Unit-II** Conic : General equation of a conic, tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of mid-point, diameter. Conjugate diameters of ellipse and hyperbola, special properties of parabola, ellipse and hyperbola, conjugate hyperbola, asymptotes of hyperbola, rectangular hyperbola. Indentification of conic in general second degree equations. **TRIGONOMETRY AND MATRICES** **Unit-II** Hermitian and skew-hermitian matrices, linear dependence of row and column vectors, row rank, column rank and rank of a matrix and their equivalence. Theorems on consistency of a system of linear equations (both homogeneous and non-homogeneous). Eigen-values,
				Sep	**1st**	diameter. Conjugate diameters of ellipse and hyperbola, special properties of parabola	
					2nd	ellipse and hyperbola, conjugate hyperbola	
					3rd	asymptotes of hyperbola, rectangular hyperbola. Indentification of conic in general second degree equations.	
					4th	Hermitian and skew-hermitian matrices	
				Oct	**1st**	row rank, column rank and rank of a matrix and their equivalence	
					2nd	Theorems on consistency of a system of linear equations (both homogeneous and non-homogeneous	
					3rd	Eigen-values, eigen-vectors and characteristic equation of a matrix	
					4th	Cayley-Hamilton theorem and its use in finding inverse of a matrix. Diagonalization.	

				Nov	**1st**	**House Test**	eigen-vectors and characteristic equation of a matrix, Cayley-Hamilton theorem and its use in finding inverse of a matrix. Diagonalization.
2	**Prof.Amanpreet Kaur**	**B.sc-I**	Paper-II Calculus Paper- III Trigonometry and Matrices	**July**	**3rd**	Properties of real numbers : Order property of real numbers, bounds, l.u.b. and g.l.b. order completeness property of real numbers	**CALCULUS – I** **Unit-I** Properties of real numbers : Order property of real numbers, bounds, l.u.b. and g.l.b. order completeness property of real numbers, archimedian property of real numbers. Limits: ε -δ definition of the limit of a function, basic properties of limits, infinite limits, indeterminate forms. Continuity: Continuous functions, types of discontinuities, continuity of composite functions, continuity of f x( ) , sign of a function in a neighborhood of a point of continuity, intermediate value theorem, maximum and minimum value theorem. **Unit-II** Mean value theorems: Rolle's
					4th	archimedian property of real numbers. Limits: ε -δ definition of the limit of a function, basic properties of limits, infinite limits	
				Aug	**1st**	indeterminate forms. Continuity: Continuous functions, types of discontinuities, continuity of composite functions, continuity of f x( )	
					2nd	sign of a function in a neighborhood of a point of continuity	
					3rd	intermediate value theorem, maximum and minimum value theorem.	
					4th	Mean value theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, their geometric interpretation	

						and applications	Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, their geometric interpretation and applications, Taylor's theorem, Maclaurin's theorem with various form of remainders and their applications. Hyperbolic, inverse hyperbolic functions of a real variable and their derivatives, successive differentiations, Leibnitz's theorem. **TRIGONOMETRY AND MATRICES** **Unit-I** D'Moivre's theorem, application of D'Moivre's theorem including primitive nth root of unity. Expansions of sin nθ , cos nθ , sinn θ , cosn θ (n∈N). The exponential, logarithmic, direct and inverse circular and hyperbolic functions of a complex variable. Summation of series including Gregory Series.
				Sep	**1st**	Taylor's theorem, Maclaurin's theorem with various form of remainders and their applications	
					2nd	Hyperbolic, inverse hyperbolic functions of a real variable and their derivatives	
					3rd	successive differentiations, Leibnitz's theorem	
					4th	D'Moivre's theorem, application of D'Moivre's theorem including primitive nth root of unity	
				Oct	**1st**	Expansions of sin nθ , cos nθ , sinn θ , cosn θ (n∈N)	
					2nd	The exponential, logarithmic, direct and inverse circular	
					3rd	hyperbolic functions of a complex variable	
					4th	Summation of series including Gregory Series	
				Nov	**1st**	**House Test**	

BACHELOR OF SCIENCE		**Session 2019-2020**		**(Third Semester)**			
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof. Gurvinder Kaur	B.Sc.-II	Paper-A Adavnced Calculus-I Paper-C Statics	July	III[rd]	Limit and continuity of functions of two and three variables	**ADVANCED CALCULUS-I** **Unit-I** Limit and continuity of functions of two and three variables. Partial differentiation. Change of variables. Partial derivation and differentiability of real-valued functions of two and three variables. Schwarz and Young's theorem. Statements of Inverse and implicit function theorems and applications. Vector differentiation, Gradient, Divergence and Curl with their properties and applications. **Unit-II** Euler's theorem on homogeneous functions. Taylor's theorem for functions of two and three variables. Jacobians. Envelopes. Evolutes. Maxima,
					IV[th]	Partial differentiation. Change of variables	
				August	I[st]	Partial derivation and differentiability of real-valued functions of two and three variables. Schwarz and Young's theorem	
					II[nd]	Statements of Inverse and implicit function theorems and applications.	
					III[rd]	Vector differentiation, Gradient, Divergence and Curl with their properties and applications.	
					IV[th]	Euler's theorem on homogeneous functions.	

					Vth	Taylor's theorem for functions of two and three variables. Jacobians.	minima and saddle points of functions of two and three variables. Lagrange's multiplier method. **STATICS** **Unit-I** Basic notions. Composition and resolution of concurrent forces – Parallelogram law of forces, Components of a force in given directions, Resolved parts of a force, Resultant of any number of coplanar concurrent forces, Equilibrium conditions for coplanar concurrent forces, equilbrium of a body resting on a smooth inclined plane. Equilibrium of three forces acting at a point – Triangle law of forces, theorem, Lami's theorem. Parallel Forces.
				Septem ber	IInd	Envelopes. Evolutes	
					IIIrd	Maxima, minima and saddle points of functions of two and three variables. Lagrange's multiplier method.	
					IVth	. Basic notions. Composition and resolution of concurrent forces – Parallelogram law of forces, Components of a force in given directions	
					Vth	Resolved parts of a force, Resultant of any number of coplanar concurrent forces,	
				October			
					IInd	Equilibrium conditions for coplanar concurrent forces,	
					IIIrd	equilbrium of a body resting on a smooth inclined plane	
					IVth	Equilibrium of three forces acting at a point – Triangle law of forces, theorem, Lami's theorem	
					Vth	Parallel Forces.	
				Novem	Ist	House Test	

				ber	II[nd]	Revision	
2.	Prof. Amanpreet Kaur	B.Sc-II	Paper- B Diiferential Equations- I Paper- C Statics	July	III[rd]	Exact differential equations. First order and higher degree equations solvable for x, y, p. Clairaut's form	**DIFFERENTIAL EQUATIONS-I** **Unit-I** Exact differential equations. First order and higher degree equations solvable for x, y, p. Clairaut's form. Singular solution as an envelope of general solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. **Unit-II** Linear differential equations with variable coefficients- Cauchy and Legendre Equations. Linear differential equations of second order- transformation of the equation by changing the dependent variable/the independent variable, methods of variation of parameters and reduction of order. Simultaneous
					IV[th]	Singular solution as an envelope of general solutions. Geometrical meaning of a differential equation.	
				August	I[st]	Orthogonal trajectories. Linear differential equations with constant coefficients	
					II[nd]	Linear differential equations with variable coefficients- Cauchy and Legendre Equations	
					III[rd]	. Linear differential equations of second order- transformation of the equation by changing the dependent variable/the independent variable	
					IV[th]	methods of variation of parameters and reduction of order.	
				Septem ber	I[st]	Simultaneous Differential Equations	
					II[nd]	Moments and Couples – Moment of a force about a point and a line, Centre of Parallel forces	
					III[rd]	theorems on moment of a couple, Equivalent couples, Varignon's theorem, generalized theorem	

						of moments	Differential Equations **STATICS** **Unit-II** Moments and Couples – Moment of a force about a point and a line, Centre of Parallel forces, theorems on moment of a couple, Equivalent couples, Varignon's theorem, generalized theorem of moments, resultant of a force and a couple, resolution of a force into a force and a couple, reduction of a system of coplanar forces to a force and a couple. Equilibrium conditions for any number of coplanar non-concurrent forces. Friction: definition and nature of friction, laws of friction, equilibrium of a particle on a rough plane, Problems on ladders, rods, spheres and circles.
					IVth	resultant of a force and a couple, resolution of a force into a force and a couple, reduction of a system of coplanar forces to a force and a couple.	
					Vth	Equilibrium conditions for any number of coplanar non-concurrent forces	
				October			
					IInd	Friction: definition and nature of friction, laws of friction	
					IIIrd	equilibrium of a particle on a rough plane	
					IVth	Problems on ladders, rods, spheres and circles.	
				Novem ber	Ist	House Test	
					IInd	Revision	

BACHELOR OF SCIENCE		**Session 2019-2020**		**(Fifth Semester)**			
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof. Gurvinder Kaur	B.Sc.-III	Paper-A Analysis-I Paper- B Modern Algebra	July	III[rd]	Countable and uncountable sets. Riemann integral	**ANALYSIS - I** **Unit-I** Countable and uncountable sets. Riemann integral, Integrability of continuous and monotonic functions, Properties of integrable functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus. Beta and Gamma functions. **Unit-II** Improper integrals and their convergence, Comparison tests, Absolute and conditional convergence, Abel's and Dirichlet's tests, Frullani's integral. Integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter. **MODERN ALGEBRA**
					IV[th]	Integrability of continuous and monotonic functions	
				August	I[st]	Properties of integrable functions, The fundamental theorem of integral calculus	
					II[nd]	Mean value theorems of integral calculus. Beta and Gamma functions.	
					III[rd]	Improper integrals and their convergence	
					IV[th]	Comparison tests, Absolute and conditional convergence, Abel's and Dirichlet's tests	

				September	Ist	Frullani's integral. Integral as a function of a parameter	**Unit-II** Rings, Integral domains, Subrings and Ideals, Characteristic of a ring, Quotient Rings, Prime and Maximal Ideals, Homomorphisms, Isomorphism Theorems, Polynomial rings.
					IInd	Continuity, derivability and integrability of an integral of a function of a parameter.	
					IIIrd	Rings	
					IVth	Integral domains, Subrings and Ideals	
				October			
					IInd	Subrings and Ideals	
					IIIrd	Characteristic of a ring, Quotient Rings, Prime and Maximal Ideals	
					IVth	Homomorphisms, Isomorphism Theorems	
					Vth	Polynomial rings.	
				November	Ist	House Test	
2.	Prof. Amanpreet Kaur	B.Sc-III	Paper- B Modern Algebra	July	IIIrd	Groups, Subgroups, Lagrange's Theorem	**MODERN ALGEBRA** **Unit-I** Groups, Subgroups, Lagrange's Theorem, Normal subgroups and Quotient Groups, Homomorphisms, Isomorphism Theorems, Conjugate elements, Class equation,
					IVth	Normal subgroups and Quotient Groups,	
			Paper –C	August	Ist	Homomorphisms, Isomorphism Theorems, Conjugate elements, Class equation	

			Probability Theory		II[nd]	Permutation Groups, Alternating groups, Simplicity of n A , n ≥ 5 (without proof).	Permutation Groups, Alternating groups, Simplicity of n A , n ≥ 5 (without proof). **PROBABILITY THEORY** **Unit- I** Review of notion of Probability, conditional Probability and independence, Bayes' Theorem. Random Variables : Concept, probability density function, cumulative distribution function, discrete and continuous random variables, expectations, mean, variance, moment generating function, skewness and kurtosis. Discrete Random Variables : Bernoulli random variable, binomial random variable, negative binomial random variable, geometric random variable, Poisson random variable. **Unit –II** Continuous Random Variables : Uniform random variable,
					III[rd]	Review of notion of Probability, conditional Probability and independence, Bayes' Theorem.	
					IV[th]	Random Variables : Concept, probability density function, cumulative distribution function, discrete and continuous random variables	
				September	I[st]	expectations, mean, variance, moment generating function, skewness and kurtosis. Discrete Random Variables : Bernoulli random variable	
					II[nd]	binomial random variable, negative binomial random variable, geometric random variable, Poisson random variable.	
					III[rd]	Continuous Random Variables : Uniform random variable, exponential random variable, Beta random variable,	
					IV[th]	Gamma random variable, Chi-square random variable, normal random variable.	
					V[th]	Bivariate Random Variables : Joint distribution,	
				October			
					II[nd]	Independent random variables	

					IIIrd	joint and conditional distributions, Conditional Expectations	exponential random variable, Beta random variable, Gamma random variable, Chi-square random variable, normal random variable. Bivariate Random Variables : Joint distribution, joint and conditional distributions, Conditional Expectations, Independent random variables, the correlation coefficient, Bivariate normal distribution.
					IVth	the correlation coefficient, Bivariate normal distribution.	
				November	Ist	House Test	
					IInd	Revision	

MASTER OF CHEMISTRY **Session 2019-2020** **(First Semester)**

S.No.	Teacher	Class	Paper	Month			Syllabus
1	Prof. Amanpreet Kaur	M.Sc Chem Ist Sem	Mathematics for chemists	July	3rd	Vectors (15 Hrs.) Vector, dot, cross and triple products etc. The gradient, divergence and curl. Vector calculus	**UNIT 1** Vectors (15 Hrs.) Vector, dot, cross and triple products etc. The gradient, divergence and curl. Vector calculus. Matrix Algebra Addition and multiplication; inverse, adjoint and transpose of matrices, special matrices (Symmetric, skew-symmetric, Hermitian, unit, diagonal, unitary, etc.) and their properties. Matrix equation: Homogeneous, non-homogenous linear and conditions for the solution, linear dependence and independence. Introduction to vector spaces, matrix eigen values and eigen vectors, diagonalization, determinants (examples from Huckel theory). Elementary Differential Equations Variables-separable and exact, first-order differential equations, homogenous, exact and linear equations. Applications to chemical kinetics, secular equilibria, quantum chemistry, etc. Solutions of differential equations by the power series method, second order differential equations and their solutions. **UNIT 2**
					4th	Matrix Algebra Addition and multiplication; inverse, adjoint and transpose of matrices, special matrices (Symmetric, skew-symmetric, Hermitian, unit, diagonal, unitary, etc.) and their properties	
				Aug	1st	Hermitian, unit, diagonal, unitary, etc.) and their properties	
					2nd	Introduction to vector spaces, matrix eigen values and eigen vectors, diagonalization	
					3rd	determinants (examples from Huckel theory). Elementary Differential Equations Variables-separable and exact, first-order differential equations, homogenous	

					4th	exact and linear equations. Applications to chemical kinetics, secular equilibria, quantum chemistry, etc	Differential Calculus (15 Hrs.) Functions, continuity and differentiability, rules for differentiation, applications of differential calculus including maxima and minima (examples related to maximally populated rotational energy levels, Bohr's radius and most probable velocity from Maxwell's distribution etc), exact and inexact differentials with their applications to thermodynamic properties. Integral calculus, basic rules for integration, integration by parts, partial fraction and substitution. Reduction formulae, applications of integral calculus. Functions of several variables, partial differentiation, co-ordinate transformations (e.g. Cartesian to spherical polar), curve sketching. Permutation And Probability Permutations and combinations, probability and probability theorems, probability curves, average, root mean square and most probable errors, examples from the kinetic theory of gases etc., curve fitting (including least squares fit etc.) with a general polynomial fit.
				Sep	1st	. Solutions of differential equations by the power series method, second order differential equations and their solution	
					2nd	Functions, continuity and differentiability, rules for differentiation	
					3rd	applications of differential calculus including maxima and minima (examples related to maximally populated rotational energy level	
					4th	Bohr's radius and most probable velocity from Maxwell's distribution etc), exact and inexact differentials with their applications to thermodynamic properties	
				Oct	1st	Integral calculus, basic rules for integration, integration by parts, partial fraction and substitution. Reduction formulae, applications of integral calculus. Functions	

						of several variables	
					2nd	partial differentiation, co-ordinate transformations (e.g. Cartesian to spherical polar), curve sketching. Permutation And Probability	
					3rd	Permutations and combinations, probability and probability theorems, probability curves, average, root mean square and most probable errors	
					4th	examples from the kinetic theory of gases etc., curve fitting (including least squares fit etc.) with a general polynomial fit	
				Nov	1st	House Test	

BACHELOR OF COMPUTER APPLICATIONS 2019-2020 (Third and Fifth Semester)

Sr. no	Teacher's name	Class	Paper	Month	Week		Syllabus
1	**Prof. Gurvinder Kaur**	**BCA-3rd sem**	Computer Oriented Numerical Methods	**July**	**3rd**	Solution of Non-Linear Equations: Introduction, Types of Non-Linear Equations: Polynomial Equations, Transcendental Equations	**UNIT - II** Solution of Non-Linear Equations: Introduction, Types of Non-Linear Equations: Polynomial Equations, Transcendental Equations, Methods of Finding Solutions of NonLinear equations: Direct Method, Iterative Method. Iterative Methods: Bisection Method, False-Position Method, Secant Method, Newton - Raphson Methods, Zeros of a polynomial using Birge – Vieta Method. Convergence of Iterative Methods, Comparison between Iterative Methods. Simultaneous Linear Equations: Solution of Simultaneous Linear Equations using Direct and Iterative Methods: Direct Methods: Gauss – Elimination Method, Gauss-Jordan Method, Concept of Pivoting, Iterative Method: Gauss-Seidal Method. **UNIT - III** Interpolation: Introduction, Lagrange Interpolation, Inverse Interpolation, Finite Differences: Forward Differences, Backward Differences, Divided
					4th	Methods of Finding Solutions of NonLinear equations: Direct Method, Iterative Method	
				Aug	**1st**	Iterative Methods: Bisection Method, False-Position Method, Secant Method	
					2nd	Newton - Raphson Methods, Zeros of a polynomial using Birge – Vieta Method	
					3rd	Convergence of Iterative Methods, Comparison between Iterative Methods. Simultaneous Linear Equations: Solution of Simultaneous Linear Equations using Direct and Iterative Methods: Direct Methods: Gauss – Elimination Method,	
					4th	Gauss-Jordan Method, Concept of Pivoting, Iterative Method: Gauss-Seidal Method.	
				Sep	**1st**	Interpolation: Introduction, Lagrange Interpolation, Inverse Interpolation,	

						Finite Differences: Forward Differences, Backward Differences	Differences, Difference Tables: Forward Difference Table, Backward Difference Table, Divided Difference Table, Observations regarding Difference Tables, Newton's Method of Interpolation: Newton' s Forward Difference Interpolation Formula, Newton' s Backward Difference Interpolation Formula, Newton' s Divided Difference Interpolation Formula. (No. of Lectures – 10) Numerical Integration: Introduction, Newton-Cotes Integration Formulae: Trapezoidal Rule, Simpson's 1/3rd Rule, Simpson's 3/8th Rule. **UNIT – IV** Approximation: Approximation of functions: Taylor Series Representation, Chebyshev Polynomials. (No. of Lectures – 07) Solution of Ordinary Differential Equations: Introduction, Euler's Method, Runga–Kutta Methods: 2nd order & 4th order, Predictor Corrector Methods: Modified Euler's Method
					2nd	Divided Differences, Difference Tables: Forward Difference Table, Backward Difference Table, Divided Difference Table, Observations regarding Difference Tables	
					3rd	Newton's Method of Interpolation: Newton' s Forward Difference Interpolation Formula, Newton' s Backward Difference Interpolation Formula, Newton' s Divided Difference Interpolation Formula.	
					4th	Numerical Integration: Introduction, Newton-Cotes Integration Formulae: Trapezoidal Rule, Simpson's 1/3rd Rule, Simpson's 3/8th Rule.	
				Oct	**1st**	Approximation: Approximation of functions: Taylor Series Representation, Chebyshev Polynomials.	
					2nd	Solution of Ordinary Differential Equations: Introduction, Euler's Method	
					3rd	Runga–Kutta Methods: 2nd order & 4th order,	
					4th	Predictor Corrector Methods: Modified	

						Euler's Method	
				Nov	**1st**	**House Test**	
2	**Prof. Amanpreet kaur**	**BCA-5th sem**	Discrete Mathematical Structure	**July**		Set Theory : Relations and Functions : Set Notation and Description, subset, basic set operations, Venn Diagrams, laws of set theory,	**UNIT – I** Set Theory : Relations and Functions : Set Notation and Description, subset, basic set operations, Venn Diagrams, laws of set theory, partitions of sets, min sets, duality principle, basic definitions of relations and functions, graphics of relations, properties of relations: injective, surjective and bijective functions, compositions. **UNIT - II** Recurrence : Recurrence Relations and Recursive Algorithms – Linear-Recurrence Relations with Constant Coefficients; Homogeneous Solutions : Particular Solution, Total Solution, Solution by the Method of Generating functions. **UNIT – III** Graph Theory : Graph and planar graphs – Basic Terminology, Multi-graphs, Weighted Graphs, Paths and Circuits, Shortest Paths, Eulerian Paths and Circuits. Travelling Salesman Problem, Planar
						partitions of sets, min sets, duality principle,	
				Aug	**1st**	basic definitions of relations and functions, graphics of relations	
					2nd	properties of relations: injective, surjective and bijective functions, compositions	
					3rd	Recurrence : Recurrence Relations and Recursive Algorithms – Linear-Recurrence Relations with Constant Coefficients;	
					4th	Homogeneous Solutions : Particular Solution, Total Solution,	
				Sep	**1st**	Solution by the Method of Generating functions.	
					2nd	Graph Theory : Graph and planar graphs – Basic Terminology,	

					3rd	Multi-graphs, Weighted Graphs, Paths and Circuits	Graphs. **UNIT – IV** Automata Theory : Finite State Machines–Equivalent Machines, Finite State Machines as language Recognizers; Analysis of Algorithms - Time Complexity, Complexity of Problems.
					4th	Shortest Paths, Eulerian Paths and Circuits	
				Oct	**1st**	Travelling Salesman Problem, Planar Graphs.	
					2nd	Automata Theory : Finite State Machines–Equivalent Machines	
					3rd	Finite State Machines as language Recognizers	
					4th	Analysis of Algorithms - Time Complexity, Complexity of Problems.	
				Nov	**1st**	**House Test**	

End Semester	**02-12-19**	**To**	**21-12-19**	**(18 days)**
Examinations	**Monday**		**Saturday**	
Semester Vacation	**22-12-19**	**To**	**02-01-19**	**(12days)**
(Winter Break)	**Sunday**		**Tuesday**	

BACHELOR OF SCIENCESession 2019-2020(Second Semester January-May)							
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof. Gurvinder Kaur	B.Sc.-I	Paper –III Theory of Equations Paper –I Solid Geometry	Jan	IInd	Euclid's algorithm, synthetic division, roots and their multiplicity. Complex roots of real polynomials occur in conjugate pairs with same multiplicity.	**THEORY OF EQUATIONS** **Unit-I** Euclid's algorithm, synthetic division, roots and their multiplicity. Complex roots of real polynomials occur in conjugate pairs with same multiplicity. Relation between roots and co-efficients. Transformation of equations. Descartes' Rule of Signs. **Unit-II** Newton's method of divisors, Solution of cubic and bi-quadratic equations, Cardan's method of solving a cubic, discriminant and nature of roots of real cubic, trigonometric solutions of a real cubic with real roots. Descarte's and Ferrari's method for a bi-quadratic. **SOLID GEOMETRY**
					IIIrd	Relation between roots and co-efficients.	
					IVth	Transformation of equations. Descartes' Rule of Signs.	

					Vth	Newton's method of divisors, Solution of cubic and bi-quadratic equations	**Unit-I** Transformation of axes: Shifting of origin and rotation of axes. Sphere: Section of a sphere and a plane, spheres through a given circle, intersection of a line and a sphere, tangent line, tangent plane, angle of intersection of two spheres and condition of orthogonality, power of a point w.r.t. a sphere, radical axis, radical center, co-axial family of spheres, limiting points. Cylinder: Cylinder as a surface generated by a line moving parallel to a fixed line and through a fixed curve, different kinds of cylinders such as right circular, elliptic, parabolic and hyperbolic cylinders in standard forms, enveloping cylinders.
				February	Ist	Cardan's method of solving a cubic, discriminant and nature of roots of real cubic	
					IInd	trigonometric solutions of a real cubic with real roots. Descarte's and Ferrari's method for a bi-quadratic.	
					IIIrd	Transformation of axes: Shifting of origin and rotation of axes.	
					IVth	Sphere: Section of a sphere and a plane, spheres through a given circle, intersection of a line and a sphere, tangent line, tangent plane,	
				March	Ist	angle of intersection of two spheres and condition of orthogonality, power of a point w.r.t. a sphere	

					IInd	radical axis, radical center, co-axial family of spheres, limiting points.	
					IIIrd	Cylinder: Cylinder as a surface generated by a line moving parallel to a fixed line and through a fixed curve	
					IVth	different kinds of cylinders such as right circular, elliptic, parabolic and hyperbolic cylinders in standard forms, enveloping cylinders.	
				April	Ist	.House Test	
					IInd	Revision	
2.	Prof. Amanpreet Kaur	B.Sc-I	Paper-II Calculus Paper- III Trigonometry and Matrices	January	IInd	Concavity, convexity and points of inflexion, Multiple points	**CALCULUS – II** **Unit-I** Concavity, convexity and points of inflexion, Multiple points, Asymptotes, Tracing of curves (Cartesian and parametric co-ordinates only). Curvature: Curvature of a curve at a point, radius of curvature of cartesian, parametric, polar curves and for implicit functions , evolute and involute, chord of curvature. **Unit-II** Integral calculus: Integration of hyperbolic and inverse hyperbolic functions. Reduction Formulae. Numerical Integration: Trapezoidal, Prismoidal and Simpson Rules. Application of definite integral: Summation of Series, Quadrature, rectification, volumes and surfaces of solids of revolution
					IIIrd	Asymptotes, Tracing of curves (Cartesian and parametric co-ordinates only	
					IVth	Curvature: Curvature of a curve at a point, radius of curvature of Cartesian functions	
				February	Ist	parametric, polar curves and for implicit functions , evolute and involute, chord of curvature.	
					IInd	Integral calculus: Integration of hyperbolic and inverse hyperbolic functions	
					IIIrd	Reduction Formulae	
					IVth	Numerical Integration: Trapezoidal, Prismoidal and Simpson Rules. Application of definite integral:	

						Summation of Series	(Cartesian co-ordinates only) **SOLID GEOMETRY** **Unit-II** Cone: Cone with a vertex at the origin as the graph of a homogeneous equation of second degree in x,y,z, cone as a surface generated by a line passing through a fixed curve and a fixed point outside the plane of the curve, reciprocal cones, right circular and elliptic cones, right circular cone as a surface of revolution obtained by rotating the curve in a plane about an axis, enveloping cones. Conicoid: Equations of ellipsoid, hyperboloid and paraboloid in standard form. Reduction of second degree equation in three variables in standard form.
				March	Ist	Quadrature, rectification, volumes and surfaces of solids of revolution (Cartesian co-ordinates only)	
					IInd	. Cone: Cone with a vertex at the origin as the graph of a homogeneous equation of second degree in x,y,z, cone as a surface generated by a line passing through a fixed curve and a fixed point outside the plane of the curve	
					IIIrd	. reciprocal cones, right circular and elliptic cones, right circular cone as a surface of revolution obtained by rotating the curve in a plane about an axis, enveloping cones	
					IVth	Conicoid: Equations of ellipsoid, hyperboloid and paraboloid in standard form. Reduction of second degree equation in three variables in standard form.	
				April	Ist	House Test	
					IInd	Revision	

BACHELOR OF SCIENCE Session 2019-2020					**(Forth Semester January-May)**		
S.No.	Teacher	Class	Paper	Month	Week		Syllabus
1.	Prof. Gurvinder Kaur	B.Sc.-II	Paper-A Adavnced Calculus-II Paper-C Dynamics	Jan	IInd	Definition of a sequence, Bounds of a sequence, Convergent, divergent and oscillatory sequences,	**ADVANCED CALCULUS II** **Unit-I** Definition of a sequence, Bounds of a sequence, Convergent, divergent and oscillatory sequences, Algebra of limits, Monotonic Sequences, Cauchy's theorems on limits, Subsequences, Bolzano-Weirstrass Theorem, Cauchy's convergence criterion. Sequential continuity and Uniform continuity of functions of single variable. **Unit-II** Series of non-negative terms. P-Test. Comparison tests. Cauchy's integral test. Cauchy's Root test. Ratio tests : Kummer's Test, D'Alembert's test, Raabe's test, De Morgan and Bertrand's test, Gauss Test, Logarithmic test. Alternating series. Leibnitz's theorem. Absolute and conditional convergence, Rearrangement of absolutely convergent series, Riemann's rearrangement theorem **DYNAMICS** **Unit-I** Motion of a particle with constant acceleration, acceleration of falling bodies, motion under gravity, motion of
					IIIrd	Algebra of limits, Monotonic Sequences, Cauchy's theorems on limits, Subsequences, Bolzano-Weirstrass Theorem,	
					IVth	Cauchy's convergence criterion. Sequential continuity and Uniform continuity of functions of single variable.	

					Vth	Series of non-negative terms. P-Test. Comparison tests. Cauchy's integral test. Cauchy's Root test. Ratio tests	a body projected vertically upwards: Newton's Laws of Motion, Motion of two particles connected by a string, motion along a smooth inclined plane, constrained motion along a smooth inclined plane. Variable acceleration: Simple harmonic motion, elastic string.
				February	Ist	Kummer's Test, D'Alembert's test, Raabe's test, De Morgan and Bertrand's test, Gauss Test, Logarithmic test.	
					IInd	Alternating series. Leibnitz's theorem. Absolute and conditional convergence	
					IIIrd	Rearrangement of absolutely convergent series, Riemann's rearrangement theorem	
					IVth	Motion of a particle with constant acceleration, acceleration of falling bodies, motion under gravity	
				March	Ist	motion of a body projected vertically upwards: Newton's Laws of Motion	
					IInd	Motion of two particles connected by	

						a string, motion along a smooth inclined plane	
					IIIrd	constrained motion along a smooth inclined plane. Variable acceleration	
					IVth	Simple harmonic motion, elastic string.	
				April	Ist	.House Test	
					IInd	Revision	
2.	Prof. Amanpreet Kaur	B.Sc-II	Paper –II Differential Equations -II Paper-III Dynamics	January	IInd	Series solution of differential equations-Power Series method,	**DIFFERENTIAL EQUATIONS- II** **Unit-I** Series solution of differential equations-Power Series method, Bessel and Legendre equations. Bessel functions of First and Second kind. Legendre function. Generating function. Recurrence relation and orthogonality of Bessel and Legendre function. Partial Differential Equations: Origin of first order Partial Differential Equations, Linear Equation of first order, Integral surfaces passing through a given curve, surfaces orthogonal to a given system of surfaces. **Unit-II** Inverse Laplace transforms- Linearity property, Shifting properties, Change of Scale Property. Inverse Laplace transforms of derivatives and integrals, Convolution theorem. Applications of Laplace Transforms - Solution of differential equations with constant coefficients, Solution of differential equations with variable coefficients, Solution of simultaneous differential equations. Laplace Transformation-Linearity of the Laplace transformation. Existence theorem for Laplace transformations, Shifting Theorems, Laplace transforms of
					IIIrd	Bessel and Legendre equations. Bessel functions of First and Second kind. Legendre function. Generating function	
					IVth	Recurrence relation and orthogonality of Bessel and Legendre function	
				February	Ist	Partial Differential Equations: Origin of first order Partial Differential Equations, Linear Equation of first order	
					IInd	Integral surfaces passing through a given curve, surfaces orthogonal to a given system of surfaces.	
					IIIrd	Inverse Laplace transforms- Linearity property, Shifting properties, Change of Scale Property.	
					IVth	. Inverse Laplace transforms of derivatives and integrals, Convolution theorem. Applications of Laplace Transforms - Solution of differential equations with constant coefficients,	

						Solution of differential equations with variable coefficients	derivatives and integrals, Multiplication of , Division by t. **DYNAMICS** **Unit-II** Curvilinear motion of a particle in a plane: Definition of velocity and acceleration, projectiles, motion in a circle. Work, power, conservative fields and the potential energy, work done against gravity, potential energy of a gravitational field. Relative motion, relative displacement, velocity and acceleration, motion relative to a rotating frame of reference. Linear momentum, angular momentum, conservation of angular momentum, impulsive forces, principle of impulse and momentum, motion with respect to centre of mass of a system of particles, collisions of elastic bodies, loss of energy during impact
				March	Ist	Solution of simultaneous differential equations. Laplace Transformation- Linearity of the Laplace transformation. Existence theorem for Laplace transformations Shifting Theorems, Laplace transforms of derivatives and integrals, Multiplication of , Division by t.	
					IInd	Curvilinear motion of a particle in a plane: Definition of velocity and acceleration, projectiles, motion in a circle.	
					IIIrd	Work, power, conservative fields and the potential energy, work done against gravity, potential energy of a gravitational field. Relative motion, relative displacement, velocity and acceleration, motion relative to a rotating frame of reference	
					IVth	Linear momentum, angular momentum, conservation of angular momentum, impulsive forces, principle of impulse and momentum, motion with respect to centre of mass of a system of particles, collisions of elastic bodies, loss of energy during impact	
				April	Ist	.House Test	

<table>
<tr><td colspan="8">BACHELOR OF SCIENCESession 2019-2020(Sixth Semester January-May)</td></tr>
<tr><td>S.No.</td><td>Teacher</td><td>Class</td><td>Paper</td><td>Month</td><td colspan="2">Week</td><td>Syllabus</td></tr>
<tr><td rowspan="6">1.</td><td rowspan="6">Prof. Gurvinder Kaur</td><td rowspan="6">B.Sc.-III</td><td rowspan="6">Paper –I

Analysis-I

Paper-III

Numerical Methods</td><td rowspan="5">Jan</td><td>IInd</td><td>Sequences and series of functions : Pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel’s and Dirichlet’s tests for uniform convergence</td><td rowspan="6">ANALYSIS - II

Unit-II

Sequences and series of functions : Pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel’s and Dirichlet’s tests for uniform convergence, uniform convergence and continuity, uniform convergence and Riemann integration, uniform convergence and differentiation, Weierstrass approximation theorem(Statement only), Abel’s and Taylor’s theorems for power series. Fourier series : Fourier expansion of piecewise monotonic functions, Fourier Series for Odd and Even Function, Half Range Series, Fourier Series in the Intervals [0, 2π], [– 1, 1] and [a, b].

NUMERICAL ANALYSIS

SECTION A

Solution of Equations: Bisection, Secant, Regula Falsi, Newton’s Method, Roots of Polynomials. Interpolation: Lagrange and Hermite Interpolation, Divided Differences, Difference Schemes, Interpolation Formulas using Difference. Numerical Differentiation. Numerical Quadrature: Newton-Cote’s Formulas, Gauss Quadrature Formulas, Chebychev’s Formulas.

SECTION B</td></tr>
<tr><td>IIIrd</td><td>uniform convergence and continuity, uniform convergence and Riemann integration, uniform convergence and differentiation, Weierstrass approximation theorem(Statement only),</td></tr>
<tr><td>IVth</td><td>Abel’s and Taylor’s theorems for power series. Fourier series : Fourier expansion of piecewise monotonic functions</td></tr>
<tr><td>Vth</td><td>Fourier Series for Odd and Even Function, Half Range Series, Fourier Series in the Intervals [0, 2π], [– 1, 1] and [a, b].</td></tr>
<tr><td>February</td><td>Ist</td><td>Solution of Equations: Bisection, Secant, Regula Falsi, Newton’s Method, Roots of Polynomials</td></tr>
</table>

					IInd	Interpolation: Lagrange and Hermite Interpolation, Divided Differences, Difference Schemes, Interpolation Formulas using Difference	Linear Equations: Direct Methods for Solving Systems of Linear Equations (Gauss Elimination, LU Decomposition, Cholesky Decomposition), Iterative Methods (Jacobi, Gauss-Seidel, Relaxation Methods). The Algebraic Eigenvalue problem: Jacobi's Method, Givens' Method, Householder's Method, Power Method, QR Method, Lanczos' Method. Ordinary Differential Equations: Euler Method, Single-step Methods, Runge-Kutta's Method, Multi-step Methods
					IIIrd	Numerical Differentiation. Numerical Quadrature: Newton-Cote's Formulas, Gauss Quadrature Formulas, Chebychev's Formulas.	
					IVth	Linear Equations: Direct Methods for Solving Systems of Linear Equations (Gauss Elimination, LU Decomposition	
				March	Ist	Iterative Methods (Jacobi, Gauss-Seidel, Relaxation Methods). The Algebraic Eigenvalue problem: Jacobi's Method, Givens' Method	
					IInd	Householder's Method, Power Method, QR Method, Lanczos' Method.	
					IIIrd	Ordinary Differential Equations: Euler Method, Single-step Methods	
					IVth	Runge-Kutta's Method, Multi-step Methods	
				April	Ist	.House Test	
					IInd	Revision	

2.	Prof. Amanpreet Kaur	B.Sc-III	Paper-II Linear algebra Paper-I Analysis-II	January	IInd	Vector Space : Definition and Examples of Vector Spaces, Subspaces, Algebra of subspaces, Linear span, Linear dependence and independence of vectors	**LINEAR ALGEBRA** **Unit-I** Vector Space : Definition and Examples of Vector Spaces, Subspaces, Algebra of subspaces, Linear span, Linear dependence and independence of vectors, Basis and dimension of a vector space, Basis and dimension of subspace, Direct sums and complements Linear transformations, Rank and Nullity of a linear transformation, Vector space of linear transformations **Unit-II** Linear transformations and matrices, Change of basis. Characteristic roots and characteristic vectors, Algebraic and Geometric multiplicity of a characteristic value, Cayley-Hamilton theorem, Diagonalizable operators and matrices. Minimal polynomial of a linear operator (matrix). **ANALYSIS - II** **Unit-I** Double and triple integrals : Double Integral over A Rectangle, Repeated Integrals in 2 R , Double Integrals over Bounded Non-rectangular Regions, Area of Bounded Regions in Plane, Double Integrals as Volumes, Change of Variables in Double Integrals, Change to Polar Coordinates, Area in Polar Coordinates, Triple Integral in Rectangular Coordinates, Triple Integrals over General Regions in 3 R , Repeated Integrals in 3
					IIIrd	Basis and dimension of a vector space, Basis and dimension of subspace, Direct sums and complements	
					IVth	Linear transformations, Rank and Nullity of a linear transformation, Vector space of linear transformations	
				February	Ist	Linear transformations and matrices, Change of basis. Characteristic roots and characteristic vectors	
					IInd	Algebraic and Geometric multiplicity of a characteristic value, Cayley-Hamilton theorem,	
					IIIrd	, Diagonalizable operators and matrices. Minimal polynomial of a linear operator (matrix).	
					IVth	Double and triple integrals : Double Integral over A Rectangle	
				March	Ist	Repeated Integrals in 2 R , Double Integrals over Bounded Non-rectangular Regions, Area of Bounded Regions in Plane	
					IInd	. Double Integrals as Volumes, Change of Variables in Double Integrals, Change to Polar Coordinates, Area in Polar	

						Coordinates, Triple Integral in Rectangular Coordinates	R , Volume of a Region in 3 R , Change of Variables in a Triple Integral to Cylindrical and Spherical Coordinates Vector Integration : Line, Surface and Volume integration. Gauss divergence theorem, Stokes' theorem, Green's theorem.
					III[rd]	. Triple Integrals over General Regions in 3 R , Repeated Integrals in 3 R , Volume of a Region in 3 R , Change of Variables in a Triple Integral to Cylindrical and Spherical Coordinates	
					IV[th]	Line, Surface and Volume integration. Gauss divergence theorem, Stokes' theorem, Green's theorem.	
				April	I[st]	.House Test	
					II[nd]	Revision	