Kanya Maha Vidyalaya, Jalandhar (Autonomous)

Scheme and Curriculum of Examinations of Three Year Degree Programme
Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester-III
Session: 2023-24

Bachelor of Arts/ Bachelor of Science(Economics, Non-Medical, Computer Science) Semester-III								
Programme Name	Course Code	Course Title	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
Bachelor of Arts Bachelor of Science (Economics) Bachelor of Science (Non-Medical) Bachelor of Science (Computer Science)	BARM-3333 BECM-3333 BSNM-3333 BCSM-3333	(I) Mathematics (Analysis)	E/C	50	40	-	10	3
Bachelor of Arts Bachelor of Science (Economics) Bachelor of Science (Non-Medical) Bachelor of Science (Computer Science)	BARM-3333 BECM-3333 BSNM-3333 BCSM-3333	(II) Mathematics (Analytical Geometry)		50	40	-	10	3

C-Compulsory

E-Elective

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester-III
Session: 2023-24
Course Title: Mathematics (Analysis)
Course Code: BARM/ BECM/ BCSM/ BSNM-3333(I)
Course Outcomes

After passing this course, the students will be able to:

CO 1: Demonstrate an understanding of limits and how they are used in sequences.

CO 2: Understanding how limits are used in series and apply various test on series.

CO 3: To understand the concepts of Riemann sum, partitions, upper and lower sums, Riemann Integrability of continuous functions and of monotone functions. Distinguish between the absolute convergence and conditional convergence.

CO 4: To know and describe the converging behaviour of improper integrals and Beta , Gamma functions. To find the relation between Beta and Gamma functions.

Examination Time: 3 Hours   Max Marks :50
                                                                                                            Theory : 40
                                                                                                            CA:10

Instructions for the Paper Setter: Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion.

Unit-II

Series of non-negative terms. Comparison tests. Cauchy's integral tests. Ratio tests. Cauchy's root test. Raabe's test, logarithmic test. Demorgan's and Bertrand's tests. Kummer's test, Cauchy Condensation test, Gauss test, Alternating series. Leibnitz's test, absolute and conditional convergence

Unit-III

Partitions, Upper and lower sums. Upper and lower integrals, Riemann integrability. Conditions of existence of Riemann integrability of continuous functions and of monotone functions. Algebra of integrable functions.

Unit-IV

Improper integrals and statements of their conditions of existence. Test of the convergence of improper integral, beta and gamma functions.

Text Book:
A. Kumar and S. Kumaresan , A Basic Course in Real Analysis, CRC Press, New York, 2014.
Reference Books:
1.S.C Malik and S. Arora, Mathematical Analysis, New Age international Publishers, New Delhi, second edition, 2005.
2.T. M. Apostal, Mathematical Analysis, Pearson education, second edition, 2004.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester–III
Session: 2023-24
Course Title: Mathematics (Analytical Geometry)
Course Code: BARM/ BECM/ BCSM/ BSNM-3333(II)
Course Outcomes

After passing this course, the students will be able to:

CO 1: Understand the concept of the geometry of lines, shifting of origin and rotation of axis in the Euclidian plane.

CO 2: Develop geometry with a degree of confidence and will gain fluency in the basics of parabola in Euclidian geometry.

CO 3: Demonstrate the concept of ellipse and hyperbola in general quadratic equation.

CO 4: Understand the concept of geometry and real time characteristics of plain and spheres.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester–III
Session: 2023-24
Course Title: Mathematics (Analytical Geometry)
Course Code: BARM/ BECM/ BCSM/ BSNM-3333(II)

Examination Time: 3 Hours   Max Marks: 50
                                                                              Theory :40
                                                                              CA:10

Instructions for the Paper Setter: Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Transformation of axes, shifting of origin, Rotation of axes in two dimension and three dimension, the invariants, Joint equation of pair of straight lines, equations of bisectors

Unit-II

Parabola and its properties. Tangents and normal, Pole and polar, pair of tangents at a point, Chord of contact, equation of the chord in terms of mid point and diameter of conic.

Unit-III

Ellipse and hyperbola with their properties. Tangents and normal, Pole and polar. pair of tangents at a point, Chord of contact, Identifications of curves represented by second degree equation (including pair of lines).

Unit-IV

Intersection of three planes, condition for three planes to intersect in a point or along a line or to form a prism. Sphere: Section of a sphere by a plane, spheres of a given circle. Intersection of a line and a sphere. Tangent line, tangent plane, power of a point with respect to a sphere, radical planes.

Text Book:
S.L. Loney, The Elements of Coordinate Geometry, Arihant Publications, Sixth edition, 2016.
Reference Books:
1.   G. Prasad and H.C. Gupta, Text Book on Coordinate Geometry, Pothishala Private Limited, Allahabad, 2000.
2.   S. Narayan and P.K. Mittal, Analytical Solid Geometry, S. Chand & company, Seventeenth edition, 2007.
3.   E. Kreyszig, Advanced Engineering Mathematics, Wiley Publisher, Tenth edition, 2010.
4.   G.B. Thomos, and R.L. Finney, Calculus and Analytic Geometry, Addison Wesley, Ninth edition, 1995.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

Scheme and Curriculum of Examinations of Three Year Degree Programme

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester-IV

Session: 2023-24

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester-IV								
Programme Name	Course Code	Course Title	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
Bachelor of Arts Bachelor of Science (Economics) Bachelor of Science (Non-Medical) Bachelor of Science (Computer Science)	BARM-4333 BECM-4333 BSNM-4333 BCSM-4333	(I) Mathematics (Statics and Vector Calculus)	E/C	50	40	-	10	3
Bachelor of Arts Bachelor of Science (Economics) Bachelor of Science (Non-Medical) Bachelor of Science (Computer Science)	BARM-4333 BECM-4333 BSNM-4333 BCSM-4333	(II) Mathematics (Solid Geometry)		50	40	-	10	3

C-Compulsory

E-Elective

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester–IV
Session: 2023-24
Course Title: Mathematics (Statics and Vector Calculus)
Course Code: BARM/BECM/ BCSM/BSNM-4333(I)
Course Outcomes

After passing this course, the students will be able:

CO 1: To apply parallelogram law of forces, triangle law of forces, Lami's theorem to real life problems and also understand that how one can resolve number of coplanar forces, parallel forces and concurrent forces acting at a body.

CO 2: To find the applications of CG of a rod, triangular lamina, solid hemisphere, hollow hemisphere, solid cone and hollow cone.

CO 3: To find the values of gradient, divergence and curl operator of given vectors

CO 4: To find the application of Gauss theorem, Green's theorem and Stokes's theorem in real life problems.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester–IV
Session: 2023-24
Course Title: Mathematics (Statics and Vector Calculus)
Course Code: BARM/BECM/ BCSM/BSNM-4333(I)

Examination Time: 3 Hours   Max Marks: 50
                                                                                          Theory :40
                                                                                          CA:10

Instructions for the Paper Setter: Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Composition and resolution of forces (parallelogram law, triangle law, polygon law, Lami's Theorem(λ-μ) theorem). Resultant of a number of coplanar forces, parallel forces. Moments ,Varignon's Theorem of moments, Couples , Resultant of two Coplanar Couples, Equilibrium of two coplanar couples, Resultant of a force and a couple, Equilibrium of coplanar forces.

Unit-II

Friction, Laws of friction, Equilibrium of a particle on a rough plane. Centre of Gravity: Centre of gravity of a rod, triangular lamina, solid hemisphere, hollow hemisphere, solid cone and hollow cone.

Unit-III

Vector differentiation, Gradient, divergence and curl operators, line integrals, Vector identity, and Vector integration.

Unit-IV

Theorems of Gauss, Green, Stokes and problems based on these.

Reference Books:
1. N.P. Bali, Statics, Laxmi Publications, Sixth edition, 2007.
2. M.R. Spiegal, Vector Analysis, Schaum's outline Series, McGraw Hill, Second edition, 2017.
3. S.L. Loney, The Elements of Statics and Dynamics, Arihant Publications, Sixth edition, 2016.
4. R.S. Verma, A Text Book on Statics, Pothishala Private Limited, Allahabad, 1962.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester–IV
Session: 2023-24
Course Title: Mathematics (Solid Geometry)
Course Code: BARM/BECM/ BCSM/BSNM-4333(II)
Course Outcomes

After passing this course, the students will be able to:

CO 1: Understand the concept of cylinder, enveloping cylinder and its limiting form.

CO 2: Demonstrate the concept of cone, classification of cone, intersection of line and cone, reciprocal cone.

CO 3: Describe the concept of conicoids or quadratic surface, its classification, trace different types of conicoids and hence find surface of revolution.

 CO 4: Describe the concept of tangent and normal plane to the conicoid and Identify the conicoids, representing it in the form of hyperboloid, ellipsoid, paraboloid.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester–IV
Session: 2023-24
Course Title: Mathematics (Solid Geometry)
Course Code: BARM/BECM/ BCSM/BSNM-4333(II)

Examination Time: 3 Hours   Max Marks:50
                                                                          Theory :40
                                                                          CA:10

Instructions for the Paper Setter: Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Cylinder as surface generated by a line moving parallel to a fixed line and through fixed curve. Different kinds of cylinders such as right circular, elliptic, hyperbolic and parabolic in standard forms

Unit-II

Cone with a vertex at the origin as the graph of homogeneous equation of second degree in *x, y, z* . Cone as a surface generated by a line passing through a fixed curve and fixed point outside the plane of the curve. Right circular and elliptic cones.

Unit-III

Equation of surface of revolution obtained by rotating the curve $f(x,y)=0$ about the z-axis in the form of $f(x^2+y^2, z) =0$. Equation of ellipsoid, hyperboloid and Paraboloid in standard forms.

Unit-IV

Surfaces represented by general equation of 2nd degree $S = 0$. Tangent lines, tangent planes and Normal Plane.

Text Book:
P. K. Jain & Khalil Ahmed, A text book of Analytical Geometry of three dimensions, New age international limited, Second edition, 2003.

 Reference Books:

1. S. Narayan, & P.K.Mittal , Analytical Solid Geometry, Sultan Chand & Sons, New Delhi, Sixteenth edition, 2002 (Scope in Chapters-7,8,11).

2. E. Kreyszig, Advance Engineering Mathematics, John Willey & Sons, tenth edition, 2011.

Scheme and Curriculum of Examinations of Three Year Degree Programme

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester-V

Session: 2023-24

Programme Name	Course Code		Course Title	Course Type	Marks				Examination time (in Hours)
					Total	Ext.		CA	
						L	P		
Bachelor of Arts Bachelor of Science (Economics) Bachelor of Science (Non-Medical) Bachelor of Science (Computer Science)	BARM-5333 BECM-5333 BSNM-5333 BCSM-5333	(I)	Mathematics (Dynamics)	E/C	50	40	-	10	3
Bachelor of Arts Bachelor of Science (Economics) Bachelor of Science (Non-Medical) Bachelor of Science (Computer Science)	BARM-5333 BECM-5333 BSNM-5333 BCSM-5333	(II)	Mathematics (Number Theory)		50	40	-	10	3

C-Compulsory

E-Elective

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–V
Session: 2023-24
Course Title: Mathematics (Dynamics)
Course Code: BARM /BECM / BCSM/ BSNM-5333(I)
Course Outcomes

After passing this course, the students will be able to:

CO 1: Demonstrate the basic relations between distance, time, velocity and acceleration, manage to solve the problems of Newton's Laws of Motion and the motion of particles connected by a string.

CO 2: Illustrate motion along a smooth inclined plane. Solve different types of problems with Variable Acceleration. Discuss Simple Harmonic Motion .

CO 3: Understand the concept of projectile, oscillating system.

CO 4: Define Work, Power and Energy and explain their relationship. Use measurement tools to apply the concepts of Work and power to solve real life problems. Identify the different types of energy.

Bachelor of Arts /Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–V
Session: 2023-24
Course Title: Mathematics (Dynamics)
Course Code: BARM/ BECM/ BCSM/ BSNM-5333(I)

Examination Time:3 Hours

Max Marks:50
Theory:40
CA:10

Instructions for the paper setter:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. The question paper must contain 30% of the article/theory from the syllabus.

Unit-I

Rectilinear motion in a straight line with uniform acceleration, Newton's laws of motion. Motion of two particles connected by a string.

Unit-II

Motion along a smooth inclined plane. Variable acceleration. Simple Harmonic Motion.

Unit-III

Curvilinear motion of particle in a plane, Definition of velocity and acceleration, projectiles, velocity and direction of motion of a projectile after a given time, projectiles on an inclined plane. Oscillations: Free Vibrations, Simple Pendulum, Conical Pendulum.

Unit-IV

Work, Power and Energy: Kinetic and Potential energy, Conservative forces. Theorem of conservation of energy. Work done against gravity.

Text Book:

R. Kumar, Fundamentals of Dynamics, Pardeep Publications, Jalandhar city, second edition, 2004

Reference Books:

1.F. Chorlton, Text Book of Dynamics, CBS Publishers, New Delhi, second edition, 2004 (Scope in chapters 3,8).

2. S.R. Gupta, Elementary Analytical Dynamics, S. Chand and Company, New Delhi, Fourteenth Edition, 1983(Scope in chapters 1,2,3)

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester–V
Session: 2023-24
Course Title: Mathematics (Number Theory)
Course Code: BARM/ BECM/ BCSM/ BSNM-5333(II)
Course Outcomes

Successful completion of this course will enable the students to:

CO 1: Prove results involving divisibility and greatest common divisors.

CO 2: Find solutions of specified linear Diophantine equation, basic properties of Congruences.

CO 3: Solve system of linear congruences. Apply Fermat's and Wilson's theorem to solve numerical problems.

CO 4: Apply Euler's theorem and apply properties of phi functions in real world problems. Understand application of important arithmetic functions.

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)
Semester–V
Session: 2023-24
Course Title: Mathematics (Number Theory)
Course Code: BARM/ BECM/ BCSM/ BSNM-5333(II)

Examination Time: 3 hrs.   Max.Marks:50
                                                                                  Theory: 40
                                                                                  CA:10

Instructions for the Paper Setter:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. The question paper must contain 30% of the article/theory from the syllabus.

Unit-I

The division algorithm, The greatest common divisor, least common multiple, The Euclidean algorithm.

Unit-II

The Diophantine equation $ax + by = c$, Prime numbers and their distribution, the fundamental theorem of arithmetic, Basic properties of congruences.

Unit-III

Linear congruences, Special divisibility tests, Chinese remainder theorem, The Fermat's theorem, Wilson's theorem

Unit-IV

Euler's Phi function, Euler's theorem, some properties of the Phi Function, σ and τ functions, Mobius Inversion formula, Greatest integer function

Text Book:

D. M. Burton, Elementary Number Theory, Mc Graw-Hill, seventh edition, 2010.

Reference Books,

1.Niven and Zuckerman, An Introduction to the theory of Numbers, John Willey & Sons, 1991.

Scheme and Curriculum of Examinations of Three Year Degree Programme

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science)

Semester-VI

Session: 2023-24

Bachelor of Arts/ Bachelor of Science (Economics, Non-Medical, Computer Science) Semester-VI								
Programme Name	Course Code	Course Title	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
Bachelor of Arts Bachelor of Science (Economics) Bachelor of Science (Non-Medical) Bachelor of Science (Computer Science)	BARM-6333 BECM-6333 BSNM-6333 BCSM-6333	(I) Mathematics (Linear Algebra)	E/C	50	40	-	10	3
Bachelor of Arts Bachelor of Science (Economics) Bachelor of Science (Non-Medical) Bachelor of Science (Computer Science)	BARM-6333 BECM-6333 BSNM-6333 BCSM-6333	(II) Mathematics (Numerical Analysis)		50	40	-	10	3

C-Compulsory

E-Elective

Bachelor of Arts/Bachelor of Science (Economics/Computer Science/Non-Medical)
Semester–VI
Session- 2023-24
Course Title: Mathematics (Linear Algebra)
Course Code: BARM/BECM/BCSM/BSNM-6333(I)
Course Outcomes

After the completion of this course, students should be able to:

CO 1: Express the algebraic concepts such as binary operation, groups, rings and fields. Define a vector space and subspace of a vector space and check the linear dependence and linear independence of vectors.

CO 2: Describe the concepts of basis and dimension of vector spaces.

CO 3: Investigate properties of vector spaces and subspaces using linear transformation.

CO 4: Find the matrix representing a linear transformation.

Bachelor of Arts/Bachelor of Science (Economics/Computer Science/Non-Medical)
Semester–VI
Session: 2023-24
Course Title: Mathematics (Linear Algebra)
Course Code: BARM/BECM/ BCSM/BSNM-6333(I)

Examination Time: 3 Hours   Max. Marks:50
                                                                  Theory:40
                                                                     CA:10

Instructions for the paper setters/examiners:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Definition of groups, rings and fields with examples. Definition of a vector space, subspaces with examples. Direct sum of subspaces. Linear span, Linear dependence, Linear independence of vectors. Linear combination of vectors.

Unit-II

Basis of a vector space, Finitely generated vector spaces. Existence theorem for basis. Invariance of the number of elements of the basis set. Dimension of sum of two subspaces. Quotient space and its dimension.

Unit-III

Linear transformation. Algebra of linear transformation. Rank-Nullity theorem, Isomorphism and Isomorphic spaces.

Unit-IV

Matrix of a linear transformation. Changes of basis, Linear operator.

Text Book:

C.W.Curtis, Linear Algebra, Springer, New York, 2017

Reference Books:

1.S. Singh, Linear Algebra, Vikas Publishing, sixth edition, 1983.

2.V. Krishnamurthy, V. P. Mainra and J. L. Arora, An Introduction to Linear Algebra, East West Press, 1976.

3.S. Narayan and P.K. Mittal, A Text Book of Matrices, S. Chand & Co, tenth edition, 1972.

Bachelor of Arts/Bachelor of Science (Economics/Computer Science/Non-Medical)

Semester–VI

Session: 2023-24

Course Title: Mathematics (Numerical Analysis)

Course Code: BARM/BECM/ BCSM/BSNM-6333(II)

After passing this course, the students will be able to:

CO 1. Know how to find the roots of transcendental and polynomial equations.

CO 2. Perform computation for solving a system of equations.

CO 3. Learn how to interpolate the given set of values.

CO 4. Learn numerical solution of differential equations & compute numerical integration and differentiation, numerical solution of ordinary differential equations.

Bachelor of Arts/Bachelor of Science (Economics/Computer Science/Non-Medical)
Semester–VI
Session: 2023-24
Course Title: Mathematics (Numerical Analysis)
Course Code: BARM/BECM/ BCSM/BSNM-6333(II)

Examination Time: 3 Hours   Max. Marks:50
                                                                   Theory:40
                                                                   CA:10

Instructions for the Paper Setter: Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

The students can use only Non Programmable& Non Storage Type Calculator.

Unit-I

Error generation, propagation, error estimation and error bounds, Solution of non-linear equations, Bisection method, Iteration method, Newton's Method, Generalized Newton's Method, Method of false position, Muller's method, Rate of convergence of these methods.

Unit-II

Solution of linear system of equation; Direct method, Gauss elimination variant (Gauss Jordan and Crout reduction), Triangular Method, Iterative Method, Jacobi's Method, Gauss Seidel Method. Finite Differences: Forward, Backward, Central, Divided differences, shift operator, relationship between the operators and detection of errors by use of difference operator. Interpolation with divided difference, Newton's formula, Lagrangian Method.

Unit-III

Finite difference interpolation, Gauss formula, Stirling formula, Bessel's formula, Error Estimation Extrapolation. Numerical differentiation, Method based on interpolation. Numerical Integration, Trapezoidal rule, Simpson's rule, Weddle rule, Romberg Integration, Gaussian integration method, Gaussian legendre integration. Double numerical integration.

Unit-IV

Numerical solution of ordinary differential equations, Initial value problem, Taylor's method, Euler's methods, Picard's method, Milne's Method, Runge-Kutta Method. Predictor- Corrector's Method.

Text Book:

M K Jain, S R K Iyenger, R K Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Private Limited, Seventh edition, 2019.