SCHEME OF EXAMINATION

AND

COURSE OF STUDY

of

Mathematics

For

B.Sc. (PCM & PGM)
(w. e. f. Session 2019--2020)

(Yearly - System)

DEPARTMENT OF MATHEMATICS

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

B.A./B.Sc. I Year

S.N.	Paper	Paper code	Maximum Marks
1.	Differential Calculus	BM101	65
2.	Integral Calculus and Trigonometry	BM102	65
3	Algebra and Matrices	BM103	70

B.A./B.Sc. II Year

S.N.	Paper	Paper code	Maximum Marks
1.	Differential Equations	BM201	65
2.	Real Analysis	BM202	65
3	Advanced Algebra	BM203	70

B.A./B.Sc. III Year

S.N.	Paper	Paper code	Maximum Marks
1.	Linear Algebra & Linear programming Problems	BM301	65
2.	Complex Analysis	BM302	65
3	Numerical Analysis	BM303	70

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: Ist Subject Code: BM-101

Course Title: DIFFERENTIAL CALCULUS Paper -I

Examination Duration: 2:30Hours Max. Marks: 65

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

    I.   Successive Differentiation, Leibnitz's theorem, Indeterminate form.

    II.   Partial Differentiation, Euler's theorem, Homogeneous Functions, Jacobian.

    III.   Tangents and Normal, Curvature, Asymptotes.

    IV.   Singular Points, Maxima and Minima.

    V.   Curve Tracing (Cartesian, Parametric, Polar).

Books Recommended:

1. M.Ray : Differential Calculus, Shiva Lal Agarwal and Co., Agra.
2. Gorakh Prasad :Differential Calculus, Pothishala publication, Allahabad

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

NAME OF THE DEPARTMENT: MATHEMATICS
B.Sc. Semester: Ist Subject Code: BM-102
Course Title: INTEGRAL CALCULUS & TRIGNOMETRY   Paper -II
Examination Duration: 2:30Hours   Max. Marks: 65

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

I.   Properties of Definite Integrals, Beta- Gamma functions.
II.   Rectification, Quadrature.
III.   Volumes and surfaces of solids of revolution, Double and triple integrals.
IV.   Separation into real and imaginary parts, Logarithmic of complex quantities, Hyperbolic functions with their inverses.
V.   Gregory's series, Summation of trigonometric series.

Books Recommended

1. G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005.

2. H. Anton, I. Bivens and S. Davis, *Calculus*, John Wiley and Sons (Asia) P. Ltd., 2002.

3. S.L.Loney: Plane Trigonometry (Part I, II), Arihant Publications.

4. M.D.Raisinghania, H.C.Sexena& H. K.Dass : Trigonometry, S. Chand & Company Pvt. Ltd. 2002.

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

NAME OF THE DEPARTMENT: MATHEMATICS
B.Sc. Semester: Ist   Subject Code: BM-103
Course Title: ALGEBRA AND MATRICES   Paper -III
Examination Duration: 2:30Hours   Max. Marks: 70

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 5. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

I.   Sets, Operations on sets, Realtions, Equivalence relations and partition Functions, Algebraic structures, Group, Example of groups, Subgroups, Permutation group.
II.   Order of an element, Cyclic -group, Coset- decomposition, Lagrange's theorem and its consequences.
III. Quotient group, Homomorphism, Isomorphism.
IV.   Rank of a matrix, Invariance of rank under elementary transformations, Adjoint of matrices, Inverse of matrices, Reduction to normal form.
V.   Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four, Solutions of a system of linear equations using matrices, Eigen values, Eigen vectors and Characteristic equation, Cayley Hamilton theorem and its Applications.

Books Recommended

1.John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
3.A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.

4.Richard Bronson, Theory and Problems of Matrix Operations, Tata McGraw Hill, 1989.

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: IInd Subject Code: BM-201

Course Title: DIFFERENTIAL EQUATIONS   Paper -I

Examination Duration: 2:30Hours   Max. Marks: 65

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

I. First order exact differential equations, Integrating factors, Rules to find an integrating factor, First order higher degree equations solvable for x, y, p, methods for solving higher-order differential equations,

II. Basic theory of linear differential equations, Wronskian, and its properties, Solving a differential equation by reducing its order.

III. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters.

IV. The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations.

V. Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method.

Books Recommended:

1. MShepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.

2. I. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition, 1967.

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

NAME OF THE DEPARTMENT: MATHEMATICS
B.Sc. Semester: IInd Subject Code: BM-202
Course Title: REAL ANALYSIS   Paper -II
Examination Duration: 2:30Hours   Max. Marks: 65

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

I.   Finite and infinite sets, Examples of countable and uncountable sets, Real line, Bounded sets, Suprema and infima, Completeness property of R, Archimedean property of R, Intervals, Concept of cluster points and statement of Bolzano-Weierstrass theorem.

II.   Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, Order preservation and squeeze theorem, Monotone sequences and their convergence, Monotone convergence theorem without proof.

III.   Infinite series, Cauchy convergence criterion for series, Positive term series, Geometric series, Comparison test, Convergence of p-series, Root test, Ratio test, Alternating series, Leibnitz's test (Tests of convergence without proof), Definition and examples of absolute and conditional convergence.

IV.   Rolle's theorem, Mean Value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series, Maclaurin's series of sin x, cos x, e^x, log (l+x), (1+x)^m.

V.   Sequences and series of functions, Point wise and uniform convergence. Mn-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.

Books Recommended

1. T. M. Apostol, *Calculus* (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.

2. R.G. Bartle and D. R Sherbert, *Introduction to Real Analysis,* John Wiley and Sons (Asia), P. Ltd., 2000.

3. K.A. Ross, *Elementary Analysis- The Theory of Calculus Series-* Undergraduate Texts in Mathematics, Springer Verlag, 2003.

4. Texts in Mathematics, Springer Verlag, 2003

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

NAME OF THE DEPARTMENT: MATHEMATICS
B.Sc. Semester: IInd   Subject Code: BM-203
Course Title: ADVANCED ALGEBRA   Paper –III
Examination Duration: 2:30Hours   Max. Marks: 70

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 5. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

   I.   Cayley's theorem, Normalizer and center of a group.
  II.   Normal subgroups and their properties, Simple group.
 III.   Rings, various types of rings, Subrings, Properties of rings.
 IV.   Ideals, Principal ideal ring, Quotient rings, Characteristics of a ring.
  V.   Integral domain, Field, Skew field; Examples and its characterizations.

Books Recommended

1.   John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.

2.   Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.

3.   Khanna & Bhambhari, A course in Abstract Algebra, 4th ED, Vikash Publication 2006.

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

NAME OF THE DEPARTMENT: MATHEMATICS
B.Sc. Semester: IIIrd Subject Code: BM-301
Course Title: LINEAR ALGEBRA & LPP   Paper –I
Examination Duration: 2:30Hours   Max. Marks: 65

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

I. Vector spaces, Subspaces, Algebra of subspaces, Quotient spaces, Linear combination of vectors, Linear span, Linear independence, Basis and dimension, Dimension of subspaces. Linear transformations, Null space, Range, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations.

II. Dual Space, Dual basis, Double dual, Characteristic polynomial, Eigenvalues and eigen vectors, Isomorphisms, Isomorphism theorems, Invertibility and isomorphisms, Change of coordinate matrix.

III. Linear programming problems, Graphical approach for solving some LPP, Convex sets, Supporting and separating hyper planes.

IV. Theory of simplex method, Optimality and unboundedness, The simplex algorithm, Simplex method in tableau format, Introduction to artificial variables.

V. Two-phase method, Big-M method and their comparison. Duality, formulation of the dual problem, Primal-dual relationships, Economic interpretation of the dual.

Books Recommended

1. Stephen H.Friedberg, Arnold J.Insel, Lawrence E.Spence, *Linear Algebra,* 4thEd., Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
2. David C.Lay, *LinearAlgebra and its Applications,* 3rdEd., Pearson Education Asia, Indian Reprint, 2007.
3. S. Lang, *Introduction to Linear Algebra,* 2nd Ed., Springer, 2005
4. F.S.Hillierand G.J.Lieberman, *Introduction to Operations Research,* 8thEd., TataMcGrawHill, Singapore, 2004.
5. Hamdy A. Taha, *Operations Research,* An Introduction*,* 8th Ed., Prentice-Hall India, 2006.

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NAME OF THE DEPARTMENT: MATHEMATICS

B.Sc. Semester: IIIrd Subject Code: BM-303

Course Title: NUMERICAL ANALYSIS   Paper –III

Examination Duration: 2:30Hours   Max. Marks: 70

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 5. Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

I. Finite difference, Difference Operator, Factorial notation, Interpolation with equal Intervals.

II. Interpolation with unequal intervals, Divided difference, Central differences Stirling and Bessel formula (application only).

III. Numerical differentiation and Integration, Simpson's 1/3 and 3/8 rule, weddle's rule Trapezoidal rule and their accuracy.

IV. Numerical solution of algebraic and transcendental equation, iterative bisection, Regula Falsi, Newton Raphson, Graeffe method.

V. Numerical solution of differential equation, Picard's Euler, Modified Euler, Runge-Kutta Method.

Recommended Books

1. B. Bradie, *A Friendly Introduction to Numerical Analysis*, Pearson Education, India, 2007.
2. M.K.Jain, S.R.K. Iyengar and R.K.Jain, Numerical Methods for Scientific and Engineering Computation, 5th Ed., New age International Publisher, India, 2007.

SRI DEV SUMAN UNIVERSITY, BADSHAHITHOL, TEHRI GARHWAL, UTTARAKHAND

NAME OF THE DEPARTMENT: MATHEMATICS
B.Sc. Semester: IIIrd   Subject Code: BM-302
Course Title: COMPLEX ANALYSIS   Paper –III
Examination Duration: 2:30Hours   Max. Marks: 65

NOTE: The question paper consists of three sections A, B and C. Section A will consist 15 objective type questions (all compulsory), each of marks 1. Section B will consists of 10 short answered questions, in which 5 to be answered, each of marks 4.   Section C will consist of 8 long answered questions, in which 5 to be answered, each of marks 6.

I.   Complex numbers and basic properties, Geometric representation of complex numbers, Trigonometrical and hyperbolic complex functions, Analytical, Cauchy-Riemann equations. Harmonic functions.

II. Conformal Mapping: Geometric representations, transformations, Theorems on Conformal mapping , Magnification, The circle, Inverse point w.r.t. a circle, Some elementary Transformations, Bilinear Transformations, Some special Bilinear Transformations, Fixed point and Normal form of a Bilinear Transformations.

III. Complex integration: Cauchy's Integral Theorem, Cauchy's fundamental theorem of integration, Cauchy's Integral formula, Cauchy's Integral formula for the derivative of Analytic functions, Morera's theorem.

IV. Cauchy's Inequality, Taylor's theorem, Laurent's series, Liouville's theorem.

V.   Zeros and singularities of Analytic functions.

Recommended Books

1.   James Ward Brown and Ruel V. Churchill, *Complex Variables and Applications,* 8th Ed., McGraw – Hill International Edition, 2009.

2.   G C sharma & M. jain: Complex Analysis, Y.K. Publishers.

3.   Mark J. Ablowitz & A. S. Fokas: Complex Variables: Introduction & Applications Cambridge Univ. Press.