(4 lecture hours per week+4 hours of practicals (2 credits)/week per batch of not more than 20 students)

UNIT-I (15 HOURS)

Matrices-I

Symmetric, Skew symmetric, Hermitian, Skew Hermitian , Elementary row and column transformations (operations), equivalent matrices, theorems on it. Row-reduced Echelon form, Normal form of a matrix , Rank of a matrix, Problems.

UNIT-II (15 HOURS)

Matrices-II

Homogeneous and Non – Homogeneous systems of *m* linear equations in *n* unknowns consistency criterion. Solution of the same by elimination method. Eigen values and Eigenvectors of a square matrix of order 2 and 3, standard properties , Cayley-Hamilton theorem (with proof). Finding A^{-1}, A^{-2} and A^2, A^3, A^4

UNIT-III (15 HOURS)

Differential Calculus -I

Successive Differentiation - n^{th} derivatives of the functions: e^{ax} , $(ax + b)^n$, log(ax + b), sin(ax + b) , cos(ax + b), $e^{ax}sin(bx+ c)$, $e^{ax}\cos(bx + c)$ – Problems Leibnitz theorem (with proof) and its applications.

Partial differentiation –Function of two and three variables - First and higher derivatives - Homogeneous functions – derivatives- Euler's theorem and its extension (with proof) - Total derivative and differential - Differentiation of implicit functions and composite functions – Problems - Jacobians – Properties of Jacobians problems.

UNIT-IV (15 HOURS)

Integral Calculus

Reduction formulae for $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \cot^n x\,dx$, $\int \sec^n x\,dx$, $\int \operatorname{cosec}^n x\,dx$, $\int \sin^m x \cos^n x\,dx$, with definite limit. Differentiation under Integral sign by Leibnitz rule

Expected Learning Outcome

- **Get the concept of symmetric, skew symmetric matrices, elementary row operations, echelon form, Solving homogenious , Non homogenious system of linear equations and Cayley-Hamilton theorem.**
- **Understand the concept of successive differentiation,homogeneous functions,Euler's theorem,Jacobian and properties.**
- **Memorize the concept of Reduction formulas for both Indefinite and definite integrals.**

Text Books/open source materials

1. Shanti Narayan and P K Mittal , Text book of *Matrices*, 5th edition, New Delhi, S Chand and Co. Pvt. Ltd.,2013.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: SChand and Co. Pvt. Ltd., 2014.
3. Shanthi Narayan and P K Mittal, *Integral Calculus*, Reprint. New Delhi: S. Chand and Co. Pvt. Ltd., 2013.
4. Shanthi Narayan and P K Mittal, *Analytical Solid Geometry*. New Delhi: S. Chand and Co. Pvt. Ltd., 2014.
5. www.scilab.org.
6. **wxmaxima**.sourceforge.net
7. www.geogebra.org

Reference Books

1. A R Vashista, Matrices, Krishna Prakashana Mandir, 2003.
2. G B Thomasand R L Finney, *Calculus and analytical geometry,Addison Wesley, 1995.*
3. B S Vatssa, *Theory of Matrices*, New Delhi: New Age International Publishers, 2005
4. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
5. N P Bali, *Differential Calculus*, India: Laxmi Publications (P) Ltd.., 2010.
6. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II1996.
7. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
8. S.P.Mahajan & Ajay Aggarwal, *Comprehensive Solid Geometry* , 1st ed.: Anmol Publications , 2000.

Useful web links:

1. http://www.cs.columbia.edu/~zeph/3203s04/lectures.html
2. http://home.scarlet.be/math/matr.htm
3. http://www.themathpage.com/
4. http://www.abstractmath.org/
5. http://ocw.mit.edu/courses/mathematics/
6. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
7. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
8. http://mathworld.wolfram.com/Calculus.html
9. http://ocw.mit.edu/courses/mathematics/
10. http://www.univie.ac.at/future.media/moe/galerie.html
11. http://mathworld.wolfram.com/AnalyticGeometry.html

PRACTICALS – I

Mathematics practicals with F*ree* and O*pen*S*ource* S*oftware* (FOSS) tools for computer programs
(4 hours/ weekper (2 credits)batch of not more than 20 students)

LIST OF PROBLEMS

1. Introduction to Scilab and commands connected with matrices.
2. Computations with matrices.
3. Row reduced echelon form and normal form.
4. Establishing consistency or otherwise and solving system of linear equations.
5. Introduction to Maxima and commands for derivatives and n^{th} derivatives.
6. Scilab and Maxima commands for plotting functions.
7. n^{th} derivative without Leibnitz rule.
8. n^{th} derivative with Leibnitz rule.
9. Obtaining partial derivative of some standard functions
10. Verification of Euler's theorem, its extension and Jacobian.
11. Maxima commands for reduction formula with or without limits.
12. Implementing vector form of line.
13. Implementing vector form of plane.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics)

SECOND SEMESTER

(4 lecture hours per week+ 4 hours of practicals(2 credits) /week per batch of not more than 20 students)

UNIT-I (15 HOURS)

Group Theory

Binary operation, algebraic structure-problems on finding identity and inverse. Definitions of semigroup and group, abelian group – problems on finite and infinite groups. Properties of group with proof – standard problems on groups – A finite semigroup with both the cancellation laws is a group – Any group of order less than five is abelian – permutation groups.

Subgroups- theorems on subgroups (with proof)- problems.

UNIT-II (15 HOURS)

Differential Calculus-II

Polar coordinates - Angle between the radius vector and the tangent - Angle of intersection of curves (polar form) polar sub-tangent and polar subnormal-perpendicular from pole on the tangent - Pedal equations. Derivative of an arc in Cartesian, parametric and polar forms.

Curvature of plane curves - formula for radius of curvature in Cartesian, parametric, polar and pedal forms - centre of curvature - evolutes. Singular points – Asymptotes – Envelopes. General rules for tracing of curves.

UNIT-III (15 HOURS)

Integral Calculus -II

Applications of Integral Calculus: computation of length of arc, plane area and surface area and volume of solids of revolutions for standard curves in Cartesian and Polar forms.

UNIT-IV (15 HOURS)

Differential Equations – I

Solutions of ordinary differential equations of first order and first degree:

(i) Linear equations, Bernoulli equation and those reducible to these.

(ii) Exact equations(excluding reducible to Exact)

(iii) Homogenous and Non Homogenous differential equations.

Equations of first order and higher degree – non linear first order, higher degree-

. (Mention) solvable for p - solvable for y - solvable for x - Clairaut's equation .

Expected Learning Outcome

- Able to define groups,abelian group,permutation groups,subgroups and understand the general properties.
- Understand the concept of polar co-ordinate system, pedal equations.
- Understand to solve problems on finding the curvature,radius of curvature,centre of curvature and general rules for various forms of curves tracing.
- Identify the applications of Integral calculus including volume of solids of revolutions.
- Learning the concepts of ordinary differential equations(O.D.E) and recognize the methods of solving Linear,Exact,Homogeneous and non Homogeneous differential equations.

Text Books/open source materials

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: S Chand and Co. Pvt. Ltd., 2014.
3. Shanthi Narayan and P K Mittal, *Integral Calculus*, Reprint. New Delhi: S. Chand and Co. Pvt. Ltd., 2013.
4. M D Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd., 2014.
5. www.scilab.org.
6. **wxmaxima**.sourceforge.net
7. www.geogebra.org

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.

5. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
6. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
7. N P Bali, *Differential Calculus*, New ed. New Delhi, India: Laxmi Publications (P) Ltd.., 2010.
8. S Narayanan & T. K. Manicavachogam Pillay, *Calculus.*: S. Viswanathan Pvt. Ltd., vol. I & II, 1996.
9. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
10. E Spiegel, *Schaum's Outline of AdvancedCalculus*, 5th ed. USA: Mc. Graw Hill., 2009.
11. M D Raisinghania, Advanced Differential Equations, S Chand and Co. Pvt. Ltd., 2013.
12. F Ayres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 2010.
13. S Narayanan and T K Manicavachogam Pillay, *Differential Equations.*: S V Publishers Private Ltd., 1981.
14. G F Simmons, *Differential equation with Applications and historical notes,* 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.

Useful web links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
5. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
6. http://mathworld.wolfram.com/Calculus.html
7. http://ocw.mit.edu/courses/mathematics/
8. http://www.univie.ac.at/future.media/moe/galerie.html
9. http://tutorial.math.lamar.edu/classes/de/de.aspx
10. http://www.sosmath.com/diffeq/diffeq.html
11. http://www.analyzemath.com/calculus/Differential_Equations/applications.html

PRACTICALS –II

Mathematics practicals with FOSS tools for computer programs

(4 hours(2 credits)/ week per batch of not more than 20 students)

LIST OF PROBLEMS

1. Creating a Scilab program (simple examples).
2. Creating a Maxima program (simple examples).
3. i.Verifying whether given operator is binary or not.
   ii. To find identity element of a group.
   iii.To find inverse element of a group.
4. Finding all possible subgroups of a finite group.
5. Plotting of standard Cartesian curves using Scilab/Maxima.
6. Plotting of standard Cartesian curves using Scilab/Maxima.
7. Plotting of standard Polar curves using Scilab/Maxima.
8. Plotting of standard parametric curves using Scilab/Maxima.
9. Scilab/Maxima programs for area and volume.
10. Solution of Differential equation using Scilab/Maxima and plotting the solution-I.
11. Solution of Differential equation using Scilab/Maxima and plotting the solution-II.
12. Solution of Differential equation using Scilab/Maxima and plotting the solution-III.
13. Solution of Differential equation using Scilab/Maxima and plotting the solution-IV.

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THIRD SEMESTER

(4 lecture hours per week+ 4 hours of practicals(2 credits) /week per batch of not more than 20 students)

UNIT-I (15 HOURS)

Groups-II

Order of an element of a group – properties related to order of an element-subgroup generated by an element of a group –coset decomposition of a group, Cyclic groups-properties- modulo relation- index of a group –Lagrange's theorem-consequences.

UNIT-II (15 HOURS)

a) Sequences Of Real Numbers

Defnition of a sequence-Bounded sequences limit of a sequence, Convergent,divergent and oscillatory sequences-Monotonic sequences and their properties-Cauchy's criterion.

b) Series of real numbers-

Defnition of convergence ,divergenceand oscillation of series- properties of convergence series- properties of series of positive terms-Geometric series-Test for convergence of series-p-series-comparison of series-Cauchy's root test- D-Alembert's ratio test-Rabee's test-Absolute and conditional convergence-D' Alembert test for absolute convergence - Alternating series - Leibnitz's test.

UNIT-III (15 HOURS)

Differential Calculus-II

Recapitulation of Equivalence Class and partition of a set. Definition of the limit of a function in ε-δ form –continuity- types of discontinuities. Properties of continuous function on a closed interval (boundedness, attainment of bounds and taking every value between bounds). Differentiability -Differentiability implies Continuity – Converse not true. Rolle's Theorem- Lagrange's and Cauchy's First Mean Value Theorem (Lagrange's form) - Maclaurin's expansion. Evaluation of limits by L' Hospital's rule

UNIT-IV (15 HOURS)

Fourier series

Trigonometric Fourier series of functions with period 2π and period $2L$ – Half range Cosine and sine series.

Expected Learning Out Come:

- Understand the concept of order of an element ,Coset of a group,Cyclic group, index group and their properties.
- Learning the concept of different sequences and their properties.
- Able to determine different types of series and whether they converges.
- Memorise the concept of types of discontinuities, knowledge of mean value theorems and indeterminate forms.
- Able to represent a periodic function as a Fourier series.

Text Books/open source materials

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Boumslag and Chandler, *Schaum's outline series on groups*, 2010.
3. S.C.Malik and Savita Arora, *Mathematical Analysis*, 2nd ed. New Delhi, India: New Age international (P) Ltd., 1992
4. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: SChand and Co. Pvt. Ltd., 2014.
5. www.scilab.org.
6. **wxmaxima**.sourceforge.net
7. www.geogebra.org

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. Richard R Goldberg, *Methods of Real Analysis*, Indian ed. New Delhi, India: Oxford and IBH Publishing Co., 1970.
6. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
7. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
8. N P Bali, *Differential Calculus*, New ed. New Delhi, India: Laxmi Publications (P) Ltd.., 2010.
9. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II1996.

10. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
11. E Spiegel, *Schaum's Outline of AdvancedCalculus*, 5th ed. USA: Mc. Graw Hill., 2009.

Useful web links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://www.math.unl.edu/~webnotes/contents/chapters.htm
5. http://www-groups.mcs.st-andrews.ac.uk/~john/analysis/index.html
6. http://web01.shu.edu/projects/reals/index.html
7. http://www.mathcs.org/analysis/reals/index.html
8. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
9. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
10. http://mathworld.wolfram.com/Calculus.html
11. http://ocw.mit.edu/courses/mathematics/

(SEC-I) (2 HOURS/WEEK)
SKILL ENHANCE COURSE

Differential Calculus

Continuity and differentiability of a function of two and three variables – Taylor's Theorem and expansion of functions of two variables- Maxima and Minima of functions Of two variables. Method of Lagrange multipliers. (9 lecture hours)

PRACTICALS –III
Mathematics practicals with FOSS tools for computer programs
(4hours(2 credits)/ week per batch of not more than 20 students)

LIST OF PROBLEMS

1. Examples to verify Lagrange's theorem.
2. Examples for finding left and right coset and finding the index of a group.
3. Illustration of convergent, divergent and oscillatory sequences using Scilab/Maxima.
4. Illustration of convergent, divergent and oscillatory series using Scilab/Maxima.
5. Scilab/Maxima programs to find the sum of the series and its radius of convergence.
6. Using Cauchy's criterion to determine convergence of a sequence (simple examples).
7. Using Cauchy's criterion on the sequence of partial sums of the series to determine convergence of a series.

8. Testing the convergence of binomial, exponential and logarithmic series and finding the sum.
9. Scilab/Maxima programs to illustrate continuity of a function.
10. Scilab/Maxima programs to illustrate differentiability of a function and unequal left hand and right hand limits for discontinuous functions.
11. Scilab/Maxima programs to verify Rolle's theorem and Lagrange's theorem.
12. Scilab/Maxima programs to verify Cauchy's mean value theorem and finding Taylor's theorem for a given function.
13. Evaluation of limits by L'Hospital's rule using Scilab/Maxima.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

FOURTH SEMESTER

(4 lecture hours per week+ 4 hours of practicals(2 credits) /week per batch of not more than 10 students)

UNIT-I (15 HOURS)

1. **ALGEBRA –IV**

Groups

Normal subgroups-examples and problems –Quotient group-Homomorphism and Isomorphism of groups-Kernel and image of a homomorphism-Normality of the Kernel-Fundamental theorem of homomorphism- properties related to isomorphism-Permutation group-Cayley's theorem.

UNIT-II (15 HOURS)

2. MATHEMATICAL METHODS - I

Definition and basic properties Laplace transform of some common functions and Standard results –Laplace transform of periodic functions- Laplace transforms ,of derivatives And the integral of function- Laplace transforms, Heaviside function

Convolution Theorem, inverse Laplace transforms.

UNIT-III (15 HOURS)

3. DIFFERENTIAL EQUATIONS –II

Second and higher order ordinary linear differential equations with constant Coefficients- complementary function- particular integrals (standard types) Cauchy-Euler differential equation. Simultaneous linear differential equations (two variables) with constant coefficients. Solutions of second order ordinary linear differential equations with variables coefficients by the following methods.

(i). When a part of complementary function is given
(ii). Changing the independent variable
(iii). Changing the dependent variable
(iv). Variation of parameters
(v). Conditions for exactness and the solution when the equation is exact.

UNIT-IV (15 HOURS)

4. 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.

Expected Learning Out Come:

- Able to define Normal subgroups,homomorphism, isomorphism and their properties.
- Understand the basic concept of Laplace transforms of some functions and standard results.
- Learning the concept of second and higher order ordinary linear differential equations.
- Analysing the convergence of sequence and series of functions.

Text Books/open source materials

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Boumslag and Chandler, *Schaum's outline series on groups*, 2010.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, 8th ed. New Delhi, India: Wiley India Pvt. Ltd., 2010.
4. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: S Chand and Co. Pvt. Ltd., 2014.
5. M D Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd., 2014.
6. www.scilab.org.
7. **wxmaxima**.sourceforge.net
8. www.geogebra.org

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995*.
6. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
7. N P Bali, *Differential Calculus*, Laxmi Publications (P) Ltd.., 2010.
8. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II1996.
9. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.

10. E Spiegel, *Schaum's Outline of AdvancedCalculus*, 5th ed. USA: Mc. Graw Hill.,2009.
11. Raisinghania M.D., *Laplace and Fourier Transforms*. New Delhi, India: S. Chand and Co. Ltd. , 1995.
12. M D Raisinghania, Advanced Differential Equations, S Chand and Co. Pvt. Ltd., 2013.
13. FAyres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 2010.
14. S Narayanan and T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.
15. G F Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.
16. S.C Mallik - Real analysis
17. S.C Mallik & Savita Arora – Mathematical Analysis
18. Richard R Goldberg – Methods of real analysis
19. Asha Rani Singhal and M.K Singhal- A first course in real analysis

Useful web links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://www.fourier-series.com/
4. http://mathworld.wolfram.com/
5. http://www.princeton.edu/~rvdb
6. http://www.zweigmedia.com/RealWorld/Summary4.html
7. http://ocw.mit.edu/courses/mathematics/
8. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
9. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
10. http://mathworld.wolfram.com/Calculus.html
11. http://ocw.mit.edu/courses/mathematics/
12. http://www.univie.ac.at/future.media/moe/galerie.html
13. http://tutorial.math.lamar.edu/classes/de/de.aspx
14. http://www.sosmath.com/diffeq/diffeq.html
15. http://www.analyzemath.com/calculus/Differential_Equations/applications.html

SEC-I (2 CREDITS/WEEK)

SKILL ENHANCE COURSE

Differential Calculus Of Scalar And Vector Fields

Scalar field – gradient of a scalar field, geometrical meaning – directional derivative – Maximum directional derivative – Angle between two surfaces - vector field – divergence and curl of a vector field – solenoidal and irrotational fields – scalar and vector potentials – Laplacian of a scalar field – vector identities. Standard properties, Harmonic functions, Problems.

SEC-II (2 CREDITS/WEEK)

SKILL ENHANCE COURSE

NUMERICAL METHODS - I

Finite differences – Definition and properties of $\triangle$, ∇, δ , μ and E, the relation between them – The nth differences of a polynomial, Factorial notations, separation of symbols, divided differences and related theorems.

Newton –Gregory forward and backward interpolation formulae – Lagrange's and Newton's interpolation formulae for unequal intervals - Inverse interpolation.

Numerical Integration: Quadrature formula – Trapezoidal rule -Simpon's 1/3 and 3/8 rule(without proofs) and problems.

PRACTICALS –IV

Mathematics practicals with FOSS tools for computer programs

(4 hours(2 Credits)/ week per batch of not more than20students)

LIST OF PROBLEMS

1. Illustrating homomorphism and isomorphism of groups.
2. Verification of Normality of a given subgroup.
3. Verifying Cayley's theorem and isomorphism theorems.
4. To plot periodic functions with period 2π and 2L.
5. To find full range trigonometric Fourier series of some simple functions with period 2π and 2L.
6. Plotting of functions in half-range and including their even and odd extensions.
7. To find the half-range sine and cosine series of simple functions.
8. Finding maxima/minima of functions of two variables.
9. Finding the Laplace transforms of some standard functions.
10. Finding the inverse Laplace transform of simple functions.
11. Implementing Laplace transform method of solving ordinary linear differential equations of first and second order with constant coefficient.
12. Finding complementary function and particular integral of constant coefficient second and higher order ordinary differential equations.
13. Finding complementary function and particular integral of constant coefficient second and higher order ordinary differential equations.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

FIFTH SEMESTER

Paper-V(45 hours)

(4 lecture hours per week+ 4hours of practicals(2credits)/week per batch of not more than 10 students)

UNIT-I (15 HOURS)

Calculus Of Variation

Variation of a function f = f(x,y,y') -variation of the corresponding functional and extremal of a functional – variational problem – Euler's equation and its particular forms – Examples – standard problems like geodesics, minimal surface of revolution, hanging chain, Brachistochrone problem –Isoperimetric problems.

UNIT-II (15 HOURS)

a). Line And Multiple Integrals

Definition of line integral and basic properties examples evaluation of line integrals.

Definition of double integral – its conversion to iterated integrals .Evaluation of double integrals by change of order of integration and by change of variables – computation of plane and surface areas ,volume underneath a surface and volume of revolution using double integrals.

UNIT-III (15 HOURS)

b). Integral Theorems

Green's theorem (with proof) - Direct consequences of the theorem.The Divergence theorem (with proof) - Direct consequences of the theorem.The Stokes' theorem (with proof) - Direct consequences of the theorem.

Triple integral and evaluation of change of variables,Volume as triple integral.

UNIT-IV (15 HOURS)

Linear Algebra

Vector space – Examples – Properties – Subspaces – criterion for a subset to be a subspace –linear span of a set - linear combination – linear independent and dependent subsets – Basis and dimensions– Standard properties – Examples illustrating concepts and results.

Linear transformations – properties – matrix of a linear transformation – change of basis – range and kernel – rank and nullity – Rank – Nullity theorem – Non-singular and singular linear transformations - Standard properties – Examples.

Expected Learning Out Come:

- Understand the concept of calculus of variation.
- Compute line and multiple integrals and their applications.
- Indentify the concept of integral theorems and applications of triple integral.
- Learning the concept of vector space, linear transformation and properties.

Text Books/open source materials

1. R Weinstock,*Calculus of Variation*, Dover, 1970.
2. M. D. Raisinghania, *Vector Calculus,* S Chand Co. Pvt. Ltd., 2013.
3. www.scilab.org
4. **wxmaxima**.sourceforge.net
5. www.geogebra.org

Reference Books

1. F B Hildebrand, *Methods in Applied Mathematics,*
2. B Spain,*Vector Analysis* , ELBS, 1994.
3. D E Bournesand, P C Kendall, *Vector Analysis*, ELBS, 1996.

Useful web links:

1. http://ocw.mit.edu/courses/mathematics/
2. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
3. http://mathworld.wolfram.com/Calculus.html
4. http://www.univie.ac.at/future.media/moe/galerie.html
5. http://www.math.gatech.edu/~harrell/calc/

FIFTH SEMESTER

Paper- VI (45 hours)

(3 lecture hours per week+ 3 hours of practical's /week per batch of not more than 10 students)

UNIT-I(15 hours)

ALGEBRA - IV

Rings, Integral Domains, Fields

Rings, Types of Rings properties of rings – Rings of integers modulo n – Subrings– Ideals ,Principal, Prime and Maximal ideals in a commutative ring – examples and standard properties following the definition – Homomorphism, Isomorphism – Properties– Quotient rings – Integral Domain- Fields - properties following the definition – Fundamental Theorem of Homomorphism of Rings - Every field is an integral domain – Every finite integral domain is a field – Problems.

UNIT-II(15 hours)

CALCULUS – V

Differential calculus of scalar and vector fields

Scalar field – gradient of a scalar field, geometrical meaning – directional derivative – Maximum directional derivative – Angle between two surfaces - vector field– divergence and curl of a vector field – solenoidal and irrotational fields – scalar and vector potentials – Laplacian of a scalar field – vector identities. Standard properties, Harmonic functions, Problems.

UNIT-III(15 hours)

NUMERICAL METHODS – I

Finite differences – Definition and properties of Δ , ∇, δ , μ and E, the relation between them – The nth differences of a polynomial, Factorial notations, separation of symbols, divided differences and related theorems.

Newton –Gregory forward and backward interpolation formulae – Lagrange's and Newton's interpolation formulae for unequal intervals - Inverse interpolation.

Numerical Integration: Quadrature formula – Trapezoidal rule -Simpon's 1/3 and 3/8 rule(without proofs) and problems.

Expected Learning Out Come:

- **Indentify the important classes of rings, integral domain, fields and properties.**
- **Able to calculate the gradient of a scalar ,curl of a vector field , identify Solenoidal and irrotational vector fields.**
- **Get the knowledge of finite differences and variation of functions with equal and unequal intervals and numerical integration.**

Suggested distribution of lecture hours.

1. Algebra IV: 1 hour /week.
2. Calculus-V (Differential calculus of scalar and vector fields): 1 hours/week
3. Numerical Methods I : 1 hours/week

Text Books/open source materials

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: S Chand and Co. Pvt. Ltd., 2014.
3. M D Raisinghania, *Vector calculus*,S Chand Co. Pvt. Ltd., 2013.
4. M K Jain, S R K Iyengar, and R K Jain, *Numerical Methods for Scientific and Engineering Computation*, 4th ed. New Delhi, India: New Age International, 2012.
5. www.scilab.org.
6. **wxmaxima**.sourceforge.net
7. www.geogebra.org

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.

5. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*

6. B Spain,*Vector Analysis* , ELBS, 1994.

7. D E Bournesand, P C Kendall, *Vector Analysis,* ELBS, 1996.

8. S S Sastry, *Introductory methods of Numerical Analysis*, Prentice Hall of India,2012.

Useful web links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
5. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
6. http://mathworld.wolfram.com/Calculus.html
7. http://www.univie.ac.at/future.media/moe/galerie.html
8. http://www.math.gatech.edu/~harrell/calc/
9. http://www.amtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/index.htm
10. http://math.fullerton.edu/mathews/numerical.html
11. http://www.onesmartclick.com/engineering/numerical-methods.html

DSE-I (2 CREDITS/WEEK)

DISCIPLINE SUBJECT ELECTIVE

DIFFERENTIAL EQUATIONS III

a). Orthogonal Curvilinear Coordinates

Definition of orthogonal curvilinear coordinates. Fundamental vectors or base vectors, Scale factors or material factors - quadratic differential form. Spherical curvilinear system : Cartesian, Cylindrical – conversion of Cylindrical to orthogonal Spherical polar coordinates. Theorem: The Spherical coordinate system is orthogonal curvilinear coordinate system. (without proof) No problems on conversions of one system to another.

DSE-I (2 CREDITS/WEEK)

DISCIPLINE SUBJECT ELECTIVE

b). Partial Differential Equations

Total differential equations-Necessary condition for the equation $Pdx+Qdy+Rdz=0$ to be integrable-Simultaneous equations of the form $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$

Formation of partial differential equation .Equations of First Order Lagrange's linear equation – Charpit's method, Standard types of first order non-linear partial differential equation (By known substitution).

Solution of second order linear partial differential equations in two variables with constant coefficients by finding complementary function and particular integral

Solution of one – dimensional heat equations, Solution of one – dimensional wave equations using Fourier series.

Text Books/open source materials

1. Krishnamoorty V K and Mainra V P and Arora J L, *An Introduction to Linear Algebra*, Reprint. New Delhi, India: Affiliated East West Press Pvt. Ltd., 2003.
2. M. D. Raisinghania, *Vector Calculus,* S Chand Co. Pvt. Ltd., 2013.
3. M D Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd., 2014.
4. www.scilab.org
5. **wxmaxima**.sourceforge.net
6. www.geogebra.org

Reference Books

1. G Strang, MIT open courseware (http://ocw.mit.edu/courses).
2. B Spain, *Vector Analysis* , ELBS, 1994.
3. D E Bournes and, P C Kendall, *Vector Analysis*, ELBS, 1996.
4. Frank Ayres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 1972.
5. GF Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.
6. S Narayanan & T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.
7. I N Sneddon, *Elements of Partial Differential Equations*, 3rd ed.: Mc. Graw Hill., 1980.

Useful web links:

1. http://ocw.mit.edu/courses/mathematics/
2. http://mathworld.wolfram.com/Calculus.html
3. http://www.math.gatech.edu/~harrell/calc/
4. http://tutorial.math.lamar.edu/classes/de/de.aspx
5. http://www.sosmath.com/diffeq/diffeq.html
6. http://www.analyzemath.com/calculus/Differential_Equations/applications.html

PRACTICALS –V

Mathematics practicals with FOSS tools for computer programs (4 hours(2 CREDITS)/ week per batch of not more than 20 students)

LIST OF PROBLEMS

1. Examples on different types of rings.
2. Examples on integral domains and fields.
3. Examples on subrings, ideals and subrings which are not ideals.
4. Homomorphism and isomorphism of rings- illustrative examples.
5. To demonstrate the physical interpretation of gradient, divergence and curl.
6. Writing gradient, divergence, curl and Laplacian in cylindrical coordinates.
7. Writing gradient, divergence, curl and Laplacian in spherical coordinates.
8. Using cyclic notations to derive different vector identities.
9. Using cyclic notations to derive some more vector identities.
10. Scilab/Maxima programs on Interpolations with equal intervals.
11. Scilab/Maxima programs on Interpolations with unequal intervals.
12. Scilab/Maxima programs to evaluate integrals using Simpson's $\frac{1}{3}^{rd}$ rule.
13. Scilab/Maxima programs to evaluate integrals using Simpson's $\frac{3}{8}^{th}$ rule.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

PRACTICALS –VI

Mathematics practicals with FOSS tools for computer programs

(4 hours(2 credits)/ week per batch of not more than 20 students)

LIST OF PROBLEMS

1. Example on Euler's equation in full form.
2. Example on particular forms of Euler's equation.
3. Examples on minimum surface of revolution and Brachistochrome problem.
4. Examples on Isoperimetric problems.
5. Evaluation of the line integral with constant limits.
6. Evaluation of the double integral with constant limits.
7. Evaluation of the triple integral with constant limits.
8. Evaluation of the line integral with variable limits.
9. Evaluation of the double integral with variable limits.
10. Evaluation of the triple integral with variable limits.
11. Verifying Green's theorem.
12. Verifying Gauss divergence theorem.
13. Verifying Stokes' theorem

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

SIXTH SEMESTER

Paper-VII(45 hours)

(4 **lecture hours per week+ 4hours of practicals(2credits)/week per batch of not more than 10 students)**

UNIT-I (15 HOURS)

Complex Analysis

Complex numbers-Cartesian and polar form-geometrical representation-complex-Plane-Euler's formula - $e^{i\theta} = cos\theta + isin\theta$. Functions of a complex variable-limit, continuity and differentiability of complex function. Analytic function, Cauchy-Riemann equations in Cartesian and Polar forms-Sufficiency conditions for analyticity(Cartesian form only)-Harmonic function-standard properties of analytic functions-construction of analytic function when real or imaginary part is given-Milne Thomson method.

UNIT-II (15 HOURS)

Complex integration-the complex integration –properties-problems.Cauchy's Integral theorem-proof using Green's theorem- direct consequences.Cauchy's Integral formula with proof-Cauchy's generalised formula for the derivatives with proof and applications for evaluation of simple line integrals - Cauchy's inequality with proof – Liouville's theorem with proof. Fundamental theorem of algebra with proof.

Transformations – conformal transformation – some elementary transformations namely Translation,rotation,magnification and inversion - examples.

The bilinear transformation (B.T.)-cross ratio-invariant points of a B.T.-properties-

(i) B.T. sets up a one to one correspondence between the extended z-plane and the extended w-plane.

(ii) Preservation of cross ratio under a B.T.

(iii) A B.T. transforms circles onto circles or straight lines.

Problems on finding a B.T., and finding images under a B.T.and invariant points of a a bilinear transformation Discussion of transformations w = e^z, w =cos z, w =sin z,w =sinh z and w=cosh z.

UNIT-III (15 HOURS)

NUMERICAL METHODS – II

Numerical solutions of algebraic and Transcendental equations – method of successive bisection - method of false position – Newton-Raphson method. Numerical solutions of non-Homogeneous system of linear algebraic equations in three variables by Jacobi's method and Gauss-Seidel method.Computation of largest Eigen value of a square matrix by power method.

UNIT-IV (15 HOURS)

Solutions of initial value problems for ordinary linear first order differential equations by Taylor's series,Euler's and Euler's modified method and Runge-Kutta 4^{th} ordered method.

Expected Learning Out Come:

- **Understand the fundamental concepts of complex analysis and the role in modern mathematics.**
- **Compute complex integration and bilinear transformation.**
- **Get the concept of numerical solutions of algebraic and transcendental equations.**
- **Learning solutions of initial value problems for first order ordinary linear differential equations.**

Text Books/open source materials

1. S Shanthinarayan, *Complex Analysis*, S Chand Co. Pvt. Ltd., 2012.
2. M K Jain, S R K Iyengar, and R K Jain, *Numerical Methods for Scientific and Engineering Computation*, 4th ed. New Delhi, India: New Age International, 2012.
3. www.scilab.org
4. **wxmaxima**.sourceforge.net
5. www.geogebra.org

Reference Books

1. R V Churchil & J W Brown, *Complex Variables and Applications*, 5th ed.: McGraw Hill Companies., 1989.
2. L V Ahlfors, *Complex Analysis*, 3rd ed.: Mc Graw Hill. , 1979.
3. A R Vashista, *Complex Analysis*, Krishna Prakashana Mandir, 2012.
4. S S Sastry, *Introductory methods of Numerical Analysis*, Prentice Hall of India, 2012.

Useful web links:

1. http://www.mathcs.org/analysis/reals/index.html
2. http://www.amtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/index.htm
3. http://math.fullerton.edu/mathews/numerical.html
4. http://www.onesmartclick.com/engineering/numerical-methods.html

Sixth semester

Paper – VII(45 hours)

(4 lecture hours per week+ 4 hours of practical's /week per batch of not more than 10 students)

UNIT-I(30 hours)

ALGEBRA –VI

Linear Algebra

Vector space – Examples – Properties – Subspaces – criterion for a subset to be a subspace –linear span of a set - linear combination – linear independent and dependent subsets – Basis and dimensions– Standard properties – Examples illustrating concepts and results.

Linear transformations – properties – matrix of a linear transformation – change of basis – range and kernel – rank and nullity – Rank – Nullity theorem – Non-singular and singular linear transformations - Standard properties – Examples.

UNIT – II(15 hours)

Fourier Transforms: Introduction-Finite Fourier transforms- finite Fourier transforms and its inverse-Fourier Sine and Cosine transforms and their inverse-properties of Fourier transforms-the convolution integral

Expected Learning Out Come:

- **Knowledge of vector space which is the foundation of linear algebra and its results.**
- **Learning linear transformations and standard properties.**
- **Able to determine the Fourier transformation of a given function and properties.**

SEC-I (2 CREDITS/4 hours /WEEK)

SKILL ENHANCE COURSE

Programming in C

Programmer's model of a computer algorithm. Flow charts. Data types. Arithmetic and input/output instructions.Decisions control structures.Decision statements.Logicalandconditionaloperators.Loop.Casecontrolstructures.functions.recursions.preprocessors.arrays.puppetting of strings.structures.pointers.file formatting.

References:

1. Henry mulish & Herbert L.Cooper,spirit of C: An introduction to modern programming, Jaico publishers,Bombay.
2. B.W Kernighan and D.M Ritchie, the c programming language 2nd edition.(ANSI features)prentice Hall,1989.
3. Peter A.Darnel and Philip E.Margolis ,c:A Software engineering approach,Narosa publishing house,1993.
4. Robert C. Hutchison and steven B.Just, Programming using C language ,Mc Graw Hill,1988.
5. Les Hancock and Morris Krieger,The C Primer,McGraw Hill,1988.
6. V.Rajaraman,Programming in C , Prentice Hall of India,1994.
7. Byron S.Gottfried,Theory and Problems of Programming with C, Tata Mc graw –Hill Publishing co.LTD.,1998.
8. S.C Mallik - Real analysis
9. S.C Mallik & Savita Arora – Mathematical Analysis
10. Richard R Goldberg – Methods of real analysis
11. Asha Rani Singhal and M.K Singhal- A first course in real analysis

SEC-II (2 CREDITS/WEEK)

SKILL ENHANCE COURSE

OPTIMIZATION

The linear programming problem.Problem formulation.Linear programming in matrix notation.Graphical solution of linear programming problems.Some basic properties of convex sets,convex functions and concave functions .Theory and application of the simplex method of solution of a linear programming problem,Charne's M-Technique.The two phase method.principle of duality in linear programming problem.Fundamental duality theorem.simple problems.The transportation and assignment problems.

References:

1. S.M Ross, introduction to probability models(sixth edition)Academic Press,1997.
2. I.Blake,An introduction to applied probability,John wiley & Sons,1979.
3. J.Pitman,Probability,Narosa,1993.
4. A.M.Yagolam and I.M.Yagolam , probability and information,Hindustan publishing corporation ,Delhi,1983.
5. Mokhtar S.Bazaraa,John J.Jarvis and Hanif D.Shirali,Linear programming and network flows,John Wiley & Sons,1990.
6. G.Hadley,Linear programming,Narosa Publishing House,1995.
7. S.I.Gass,Linear programming: methods and applications(4^{th} edition)McGraw-Hill,New York,1975.
8. Kanti Swaroop P.K.Gupta and Man mohan,operations Research,sultan chandn &sons,New Delhi,1998.

PRACTICALS –VII

Mathematics practicals with FOSS tools for computer programs
(4 hours(2 credits)/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. i. Vector space, subspace – illustrative examples.
   ii. Expressing a vector as a linear combination of given set of vectors.
   iii. Examples on linear dependence and independence of vectors.
2. i) Basis and Dimension – illustrative examples.
   ii)Verifying whether a given transformation is linear.
3. i. Finding matrix of a linear transformation.
   ii. Problems on rank and nullity.
4. Plotting of cylinder and cone using orthogonal curvilinear coordinates.
5. Plotting of sphere using orthogonal curvilinear coordinates.
6. Solutions to the problems on total and simultaneous differential equations.
7. Solutions to the problems on different types of Partial differential equations.
8. Solving second order linear partial differential equations in two variables with constant coefficient.
9. Solving some more second order linear partial differential equations in two variables with constant coefficient.
10. Solution of one dimensional heat equation using Fourier series with Dirichlet condition.
11. Solution of one dimensional heat equation using Fourier series with Neumann condition.
12. Solution of one dimensional wave equation using Fourier series with Dirichlet condition.
13. Solution of one dimensional wave equation using Fourier series with Neumann condition.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

PRACTICALS –VIII

Mathematics practicals with FOSS tools for computer programs
(4hours(2 credits)/ week per batch of not more than 20 students)

LIST OF PROBLEMS

1. Some problems on Cauchy-Riemann equations (polar form).
2. Implementation of Milne-Thomson method of constructing analytic functions(simple examples).
3. Illustrating orthogonality of the surfaces obtained from the real and imaginary parts of an analytic function.
4. Verifying real and imaginary parts of an analytic function being harmonic (in polar coordinates).
5. Illustrating the angle preserving property in a transformation.
6. Illustrating that circles are transformed to circles by a bilinear transformation.
7. Examples connected with Cauchy's integral theorem.
8. Solving algebraic equation (Bisection method).
9. Solving algebraic equation (Regula-Falsiand Newton-Raphson methods).
10. Solving system of equations (Jacobi and Gauss-Seidel methods).
11. Solving for largest eigenvalue by Power method.
12. Solving ordinary differential equation by modified Euler's method.
13. Solving ordinary differential equation by Runge-Kutta method of 4^{th} order.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

JSS COLLEGE FOR WOMEN (AUTONOMOUS)

SARASWATHIPURAM, MYSURU – 09

DEPARTMENT

OF

MATHEMATICS

REREVISED CBCS SYLLABUS WITH PRACTICAL COMPONENT :

2018 onwards

- **Proceedings of BoS**
- **Scheme of Exam**
- **Syllabus**
- **Question Paper Pattern**

JSS COLLEGE FOR WOMEN (AUTONOMOUS) SARASWATHIPURAM, MYSURU – 09

SUBJECT: MATHEMATICS **CHAIR PERSON : B.S .ANITHA**

PROCEEDINGS OF BOS meeting held on : 23/03/2018

Members Present :

1. B.S. Anitha
   Chairperson,Jsscw Mysuru
2. Dr.K.R .Vasuki
   Associate Professor of Mathematics
   University of Mysore,Mysuru
3. Prof M.N.Kempegowda
   Retd.Associate Professor of Mathematics,Mysuru
4. Prof Jagannath H Godkhindi
   Associate Professor of Mathematics,Maharani's Science College,Mysuru
5. Prof Saly Abraham
   Associate Professor of Mathematics,Teresian College,Mysuru
6. Prathibha urs. L
   Assistant Professor ,Jsscw,Mysuru
7. Rajeshwary . G
   Student alumni ,
   Manasa Gangotri,Mysuru,

Resolved that :

- The revised regulations CBCS syllabus 2018, the scheme of examination and instruction are approved.
- The question paper pattern is approved.
- The panel of examiners list is approved.

		C1	C2
The internal assessment segments:	Theory	: 10marks	10marks
	Practical	: 05marks	05marks
	Total	: 15marks	15 Marks
	Grand Total	: 30 Marks	

Resolved the revised regulations 2018 is applicable only to those students admitted during 2018 onwards.

The syllabus , the scheme of Examination and question paper pattern of certificate course is approved.

Date : Signature of the Chairperson

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

First Semester B.Sc Examination

MATHEMATICS

Algebra -I and Calculus -I

Time : 3Hours **Max .Marks : 70**

Instructions: 1.Section A is compulsory.

2.All questions in sections B,C and D carry equal marks.

SECTION- A

Answer any FIVE questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....

e).....f).....g).....h).....

SECTION-B

(Algebra)

Answer any TWO main questions.

2. a).....b).....c).....

3. a).....b).....c).....

4. a).....b).....c).....

SECTION-C

(Differential Calculus)

Answer any TWO main questions.

5. a).....b).....c).....

6. a).....b).....c).....

7. a).....b).....c).....

SECTION –D

(Integral Calculus)

Answer any ONE main question.

8.a).....b).....c).....

9.a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Second Semester B.Sc Examination

MATHEMATICS

Algebra -II , Calculus –II and Differential Equations-I

Time : 3Hours **Max .Marks : 70**

Instructions: 1.Section A is compulsory.

2.All questions in sections B,C and D carry equal marks.

SECTION- A

Answer any FIVE questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....

SECTION-B

(Algebra)

Answer any ONE main question.

2. a).....b).....c).....

3. a).....b).....c).....

SECTION-C

(Differential and Integral Calculus)

Answer any TWO main questions.

4. a).....b).....c).....

5. a).....b).....c).....

6. a).....b).....c).....

SECTION –D

(Differential Equations)

Answer any TWO main questions.

7. a).....b).....c).....

8. a).....b).....c).....

9. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Third Semester B.Sc Examination

MATHEMATICS

Algebra -III , Analysis -I and Differential Calculus-III

Time : 3Hours **Max .Marks : 70**

Instructions: 1.Section A is compulsory.

2.All questions in sections B,C and D carry equal marks.

SECTION- A

Answer any FIVE questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....

e).....f).....g).....h).....

SECTION-B

(Algebra)

Answer any ONE main question.

2. a).....b).....c).....

3. a).....b).....c).....

SECTION-C

(Analysis)

Answer any THREE main questions.

4. a).....b).....c).....

5. a).....b).....c).....

6. a).....b).....c).....

7.a).....b).....c).....

SECTION –D

(Differential Calculus)

Answer any ONE main question.

8. a).....b).....c).....

9. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Forth Semester B.Sc Examination

MATHEMATICS

Algebra –IV, Mathematical Methods-I ,Differential Equations-II and Analysis-II

Time : 3Hours **Max .Marks : 70**

Instructions: 1.Section A is compulsory.

2.All questions in sections B,C and D carry equal marks.

SECTION- A

Answer any FIVE questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....

SECTION-B

(Algebra)

Answer any ONE main question.

2. a).....b).....c).....
3. a).....b).....c).....

SECTION-C

(Mathematical Methods)

Answer any ONE main question.

4. a).....b).....c).....
5. a).....b).....c).....

SECTION –D

(Differential Equations)

Answer any TWO main questions.

6. a).....b).....c).....
7. a).....b).....c).....
8. a).....b).....c).....

SECTION-E

(Sequences and Series of Functions)

Answer any ONE main question.

9. a).....b).....c).....

10.a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Fifth Semester B.Sc Examination

MATHEMATICS

Algebra –V and Integral Calculus

Time : 3Hours **Max .Marks : 70**

Instructions: 1.Section A is compulsory.

2.All questions in sections B,C and D carry equal marks.

SECTION- A

Answer any FIVE questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....

SECTION-B

(Calculus of variation)

Answer any ONE main question.

2. a).....b).....c).....
3. a).....b).....c).....

SECTION-C

(Line and multiple integrals and Integral theorems)

Answer any TWO main questions.

4. a).....b).....c).....
5. a).....b).....c).....
6. a).....b).....c).....

SECTION –D

(Linear algebra)

Answer any TWO main questions.

7. a).....b).....c).....
8. a).....b).....c).....
9. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Fifth Semester B.Sc Examination

MATHEMATICS

Algebra –V and Differential calculus Numerical analysis-I

Time : 3Hours **Max.Marks:70**

Instructions: 1.Section A is compulsory.

2.All questions in sections B,C and D carry equal marks.

SECTION- A

Answer any FIVE questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....

SECTION-B

(Rings Integral Domains and Fields)

Answer any TWO main questions

2. a).....b).....c).....
3. a).....b).....c).....
4. a).....b).....c).....

SECTION-C

(Differential Calculus of Scalar and Vector Fields)

Answer any ONE main question.

5. a).....b).....c).....
6. a).....b).....c).....

SECTION –D

(Numerical Analysis)

Answer any TWO main questions.

7. a).....b).....c).....
8. a).....b).....c).....
9. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Sixth Semester B.Sc Examination

MATHEMATICS

Complex Analysis and Numerical Analysis II

Time : 3Hours **Max .Marks : 70**

Instructions: 1.Section A is compulsory.

2.All questions in sections B and C carry equal marks.

SECTION- A

Answer any FIVE questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....

SECTION-B

(Complex Analysis)

Answer any THREE main questions.

2. a).....b).....c).....
3. a).....b).....c).....
4. a).....b).....c).....
5. a).....b).....c).....
6. a).....b).....c).....

SECTION-C

(Numerical Analysis)

Answer any TWO main questions.

7. a).....b).....c).....
8. a).....b).....c).....
9. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Sixth Semester B.Sc Examination

MATHEMATICS

Algebra and Analysis

Time : 3Hours **Max .Marks : 70**

Instructions: 1.Section A is compulsory.

2.All questions in sections B and C carry equal marks.

SECTION- A

Answer any FIVE questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....

SECTION-B

(Linear Algebra)

Answer any THREE main questions.

2. a).....b).....c).....
3. a).....b).....c).....
4. a).....b).....c).....
5. a).....b).....c).....
6. a).....b).....c).....

SECTION-C

(Fourier Transforms)

Answer any TWO main questions.

7. a).....b).....c).....
8. a).....b).....c).....
9. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Fifth Semester B.Sc Examination

MATHEMATICS

SEC-I

Differential equations III

Time : 2Hours **Max.Marks:50**

SECTION-A

Answer any TEN questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....
i).....j).....k).....l).....

SECTION-B

(Orthogonal curvilinear co-ordinates)

Answer any TWO main questions.Each main question carries fifteen Marks.

2. a).....b).....c).....
3. a).....b).....c).....
4. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Fifth Semester B.Sc Examination

MATHEMATICS

SEC-II

Differential equations III

Time : 2Hours **Max.Marks:50**

SECTION-A

Answer any TEN questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....
i).....j).....k).....l).....

SECTION-B

(Partial Differential Equations)

Answer any TWO main questions.Each main question carries fifteen marks.

2. a).....b).....c).....
3. a).....b).....c).....
4. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Sixth Semester B.Sc Examination

MATHEMATICS

SEC-I

C-Programming

Time : 2Hours **Max.Marks:50**

SECTION- A

Answer any TEN questions. Each question carries TWO marks:

1. a)..... b)..... c)..... d).....
e).....f).....g).....h).....
i).....j).....k).....l).....

SECTION-B

(Programming in C)

Answer any TWO main questions.Each main question carries fifteen marks.

2. a).....b).....c).....
3. a).....b).....c).....
4. a).....b).....c).....

JSS COLLEGE FOR WOMEN

AN AUTONOMOUS COLLEGE OF THE UNIVERSITY OF MYSORE

Sixth Semester B.Sc Examination

MATHEMATICS

SEC-II

Linear Programming

Time : 2Hours **Max.Marks : 50**

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SECTION- A

Answer any TEN questions. Each question carries TWO marks:

1. a)..... b)..... .c)..... .d).....
e).....f).....g).....h).....
i).....j).....k).....l).....

SECTION-B
(Linear Programming)

Answer any TWO main questions.Each main question carries fifteen marks.

2. a).....b).....c).....
3. a).....b).....c).....
4. a).....b).....c).....

JSS COLLEGE FOR WOMEN(AUTONOMOUS)

SARASWATHIPURAM,MYSURU-09

DEPARTMENT OF MATHEMATICS

Proceeding of the meeting of Board of studies(U.G) in Mathematics

Held on March 24th 2018 at the Department of Mathematics,JSSCW

SL.NO.	Members Present
1	B.S.Anitha Chairperson and HoD of Mathematics JSSCW,Saraswathipuram,Mysuru-09
2	Dr.Vasuki.K.R Associate Professor DoS in Mathematics,University of Mysore,Mysuru
3	Jagannath.H.Godkhindi Associate Professor Maharani's science college,Mysuru
4	Saly Abraham Associate Professor, Teresian College,Mysuru
5	M.N.Kempegowda Associate Professor,(Retd) Yuvaraja's college,Mysuru
6	Prathiba Urs.L Assistant Professor, JSSCW,Mysuru
7	Rajeshwari.G Research Scholar University of Mysore,Mysuru

Proceedings:

Agenda	Decision	Action taken
Frame the Choice Based Credit System Syllabus	1)syllabus was framed 2)Question paper pattern for thery exam was framed 3)Internal assessment segment C1 C2 Theory 10 10 Practical 05 05 Total 15 15 Grand total 30	

Resolution passed in the meeting

1. The Choice Based Credit System (CBCS) with practical components for B.Sc course in Mathematics will come into effect from the academic year 2018-19
2. This scheme is applicable to the students who gets admission to B.Sc undergraduate course in the year 2018-19 and onwards.
3. The Board has given consent and approved.
   a) The syllabus and the scheme of examination
   b) The Question paper pattern
   c) The Internal Assessment Segments:
      i) Skill development program
      ii) Tests
   d) Board of examiners.
   e) The names of Examiners for central valuation as included in the gradation list.

The Chairperson thanked the members at the end

Signature of the Chairperson

JSS COLLEGE FOR WOMEN(AUTONOMOUS)

SARASWATHIPURAM,MYSURU-09

DEPARTMENT OF MATHEMATICS

List of Examiners

Subject:Mathematics

SL.NO	Name and Designation	Total no of Services.
1.	B.S.Anitha Assistant Professor,JSSCW ,Saraswathipuram,Mysuru	33
2.	Prathiba Urs.L Assistant Professor,JSSCW ,Saraswathipuram,Mysuru	08
3.	Sumalatha.B Assistant Professor,JSSCW ,Saraswathipuram,Mysuru	05
4.	Jagannath.H.Godkhindi Associate Professor,Maharani's Science College,Mysuru	35
5.	A.C.Chandrashekar Assistant Professor,Maharani's Science College,Mysuru	10
6.	Shreedhar Assistant Professor,Maharani's Science College,Mysuru	10
7.	Mahadevaswamy Assistant Professor,Maharani's Science College,Mysuru	10

8.	Dr.Dharmendra Assistant Professor,Maharani's Science College,Mysuru	13
9.	Gowtham Swamy Assistant Professor,Maharani's Science College,Mysuru	15
10.	Dr.Shivashankar Assistant Professor,Yuvaraja's College,Mysuru	20
11.	Dr.Ruby Assistant Professor,Yuvaraja's College,Mysuru	15
12.	Dr.Manohar Assistant Professor,Yuvaraja's College,Mysuru	10
13.	Dr.Sumathi Assistant Professor,Mahajana's college,Mysuru	15
14.	Saly Abraham Associate Professor,Teresian college,Mysuru	33
15.	Dr.Jayanthi Associate Professor,Teresian college,Mysuru	25

JSS COLLEGE FOR WOMEN(AUTONOMOUS)

SARASWATHIPURAM,MYSURU-09

DEPARTMENT OF MATHEMATICS

Proceeding of the meeting of Workshop(U.G) in Mathematics

Held on March 22nd and 23rd 2018 at the Department of Mathematics,JSSCW

SL.NO.	Members Present
1	B.S.Anitha Chairperson and HoD of Mathematics JSSCW,Saraswathipuram,Mysuru-09
2	Dr.Vasuki.K.R Associate Professor DoS in Mathematics,University of Mysore,Mysuru
3	Jagannath.H.Godkhindi Associate Professor,Maharani's science college,Mysuru
4	Lakshmi Shastry Associate Professor,S D M College,Mysuru
5	M.N.Kempegowda Associate Professor,(Retd) Yuvaraja's college,Mysuru
6	A.C.Chandrashekar Assistant Professor,Maharani's Science College ,Mysuru
7	Prathiba Urs.L Assistant Professor, JSSCW,Mysuru
8	Sumalatha.B Assistant Professor, JSSCW,Mysuru

9	Revathi.M Assistant Professor, JSSCW,Mysuru
10	Veena.H.S Assistant Professor, JSSCW,Mysuru

Proceedings:

Agenda	Decision	Action taken
Frame the Choice Based Credit System Syllabus	1)syllabus was framed 2)Question paper pattern for thery exam was framed 3)Internal assessment segment C1 C2 Theory 10 10 Practical 05 05 Total 15 15 Grand total 30	

The Choice Based Credit System (CBCS) with practical components for B.Sc course in Mathematics will come into effect from the academic year 2018-19

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   a)The syllabus and the scheme of examination
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   c) The Internal Assessment Segments:
      i) Skill development program
      ii) Tests
   d) Board of examiners.
   e) The names of Examiners for central valuation as included in the gradation list.

The Chairperson thanked the members at the end

Signature of the Chairperson

JSS COLLEGE FOR WOMEN (AUTONOMOUS) ,SARASWATHIPURAM, MYSURU – 09

SCHEME OF INSTRUCTIONS & EXAMMINATION FOR SUBJECT WITH PRACTICALS

SUBJECT: MATHEMATICS

Semester	Name of the course	Course title and Code	Workload per week		Examination Marks			Exam duration		Total marks
			Th	Pr	Exam		C1+C2+ Assignment +Viva			
					Th	Pr		Th	Pr	
1	Paper – I (core paper)	Algebra –I , Calculus - I **[DSC-3A]**	4hours	4hours	50	20	30	3hours	3hours	100
2	Paper – II (core paper)	Algebra –II , Calculus – II,Differential equations I **[DSC-3B]**	4hours	4hours	50	20	30	3hours	3hours	100
3	Paper – III (core paper)	Algebra –III ,Analysis I and Calculus –III **[DSC-3C]**	4hours	4hours	50	20	30	3hours	3hours	100
4	Paper – IV (core paper)	Algebra –IV ,Analysis II, and Differential equation-II **[DSC-3D]**	4hours	4hours	50	20	30	3hours	3hours	100
5	Paper – V (core paper)	Algebra V , Calculus IV and Numerical Analysis I **[DSC-3A]**	4hours	4hours	50	20	30	3hours	3hours	100
	Paper – VI (core paper)	Algebra V and Calculus V **[DSC-3A]**	4hours	4hours	50	20	30	3hours	3hours	100
6	Paper – VII (core paper)	Algebra VI **[DSC-3A]**	4hours	4hours	50	20	30	3hours	3hours	100
	Paper – VIII (core paper)	Algebra VI ,Analysis III and Numerical Analysis II **[DSC-3A]**	4hours	4hours	50	20	30	3hours	3hours	100