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 CHAIRPERSON : B.S . ANITHA

PROCEEDINGS OF BOS MEETING HELD ON :23/03/2018

Members Present :

1. B.S. Anitha
Chairperson, JSSCW, Mysuru
2. Dr.Vasuki.K.R
Associate Professor
DoS in Mathematics,University of Mysore,Mysuru
3. Prof. M.N.Kempegowda
Associate Professor,(Retd)
Yuvaraja's college,Mysuru
4. Prof. Jagannath.H.Godkhindi
Associate Professor,Maharani's science college,Mysuru
5. Prof. Saly Abraham
Associate Professor of Mathematics , Teresian College , Mysuru
6. Prathiba urs. L
Assistant Professor of Mathematics , JSSCW , Mysuru
7. Rajeshwari . G
Student Alumni ,
Manasa Gangathri , Mysuru

Resolved that :

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

The internal assessment segments :	**Theory**	**: 10marks**	**10marks**
	Practical	**: 05marks**	**05marks**
	Total	**: 15marks**	**15marks**

Grand Total : 30marks

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(AUTONOMOUS),SARASWATHIPURAM,MYSURU -09

SCHEME OF INSTRUCTIONS & EXAMMINATION FOR SUBJECT WITH PRACTICALS

SUBJECT: MATHEMATICS

Sem ester	Name of the course	Course title and Code	Workload per week		Examination Marks			Exam duration		Total marks
			Th	Pr	Exam		C1+C2 +Assign ment +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 and Differential equations - I [DSC-3B]**	4hours	4hours	50	20	30	3hours	3hours	100
3	Paper – III (core paper)	**Algebra –III ,Analysis -I and Differential Calculus –III [DSC-3C]**	4hours	4hours	50	20	30	3hours	3hours	100
4	Paper – IV (core paper)	**Algebra –IV ,Analysis II, and Differential equations II [DSC-3D]**	4hours	4hours	50	20	30	3hours	3hours	100
5	Paper – V (core paper)	**Rings & Fields And Numerical Analysis [DSE-3A]**	4hours	4hours	50	20	30	3hours	3hours	100
	Paper – VI (core paper)	**Calculus of Variation, Orthogonal Curvilinear Co-Ordinates, Riemann Integration & Fourier transformations [DSE-3A]**	4hours	4hours	50	20	30	3hours	3hours	100
6	Paper – VII (core paper)	**Complex Analysis and Linear Algebra [DSE-3B]**	4hours	4hours	50	20	30	3hours	3hours	100
	Paper – VIII (core paper)	**Differential Calculus, Scalar & Vector Fields, Transformations and Improper Integrals [DSE-3B]**	4hours	4hours	50	20	30	3hours	3hours	100

Semester	Name of the course	Course title and Code	Workload per week		Examination Marks		Exam duration hours	Total marks
			Th	Pr	Exam	C1+C2 +Assignment +Viva		
5	**SEC –I**	Partial differential equations	**2**	**-**	**40**	**10**	**2**	**50**
	SEC-2	Basics of Graph theory	**2**	**-**	**40**	**10**	**2**	**50**
6	**SEC-3**	Line and Multiple integrals , Integral theorems	**2**	**-**	**40**	**10**	**2**	**50**
	SEC-4	Programming in C	2	**-**	**40**	**10**	**2**	**50**

FIRST SEMESTER

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

UNIT-I (16 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 (16 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 Eigen vectors 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 (16 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 (16 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 Free and Open Source Software (FOSS) tools for computer programs
(4 hours/ Week per (2 credits) batch of not more than 20 students)

LIST OF PROGRAMS

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 (16 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 (16 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 (16 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 (16 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 PROGRAMS:

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 (16 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 (22 HOURS)

a) Sequences of Real Numbers

Definition 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**

Definition of convergence ,divergence and 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's test for absolute convergence - Alternating series - Leibnitz's test.

UNIT-III (16 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 (10 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/

PRACTICALS –III

Mathematics practicals with FOSS tools for computer programs

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

LIST OF PROGRAMS:

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 20 students)

UNIT-I (16 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 (16 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 (16 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 (16 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

PRACTICALS –IV

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

LIST OF PROGRAMS:

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 (64 HOURS)

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

UNIT- I(16 HOURS)

Rings and Fields

Rings -Examples- integral domains -division rings-Fields-Sub rings. Subfields-Characteristics of ring-Ordered integral domain-Imbedding of a ring into another ring-The Field of a quotients-Ideals-Algebra of Ideals-Principal Ideal Ring-Divisibility in an integral domain-Units and Associates-Prime elements.

UNIT-II (16 HOURS)

Polynomial rings and Homomorphism

Polynomial rings-Divisibility-Irreducible polynomials-Division algorithm-Greatest common divisors-Euclidean algorithm-Unique factorization theorem-prime fields-Quotient rings-Homomorphism of rings-Kernel of ring homomorphism-Fundamental theorem of Homomorphism-Isomorphism-Automorphism-Maximal Ideals-Prime Ideals-Properties-Eisentein's criterian of irreducibility.

UNIT-III (16 HOURS)

Numerical Methods-I

Finite differences, forward and backward differences – Definition and properties of Δ , ∇, δ , μ and E, the relation between them .

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

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

UNIT-IV (16 HOURS)

Numerical Methods -II

Numerical solutions of Algebraic and Transcendental equations – method of successive bisection - method of false position – Newton-Raphson method.

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} order method ,Picard's Method.

Expected Learning outcome:

- Identify the important classes of rings ,Integral domain, Fields and properties.
- Get the Knowledge of Homomorphism of a ring ,polynomial of a ring and Ideals.
- Finding the Numerical solutions of Algebraic and transcendental equations and First order linear differential equations.
- Get the Knowledge of finite differences and variation of functions with equal and unequal intervals and numerical integration.

Books for Reference :

- I.N. Herstien –Topics in Algebra
- Vashista, A first course in modern algebra,11^{th} edition Krishna prakashan mandir,1980
- Stewart – Introduction to Linear Algebra
- S.S Sastry ,Introductory method of numerical analysis,Prentice Hall of India,2012
- B.D. Gupta – Numerical analysis
- H.C.saxena-Finite difference and Numerical analysis.
- Michael Artin, Algebra,2^{nd} ed.New Delhi,India:PHI Learning Pvt.Ltd

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 (64 HOURS)

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

UNIT-I (16 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 (16 HOURS)

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.

UNIT-III(16 HOURS)

Riemann integration(16 hours)

The Riemann integral- upper and lower sums-Criterion for integrability-Integrability of continuous functions and monotonic functions. Fundamental theorem of calculus – Change of variables – Integration by parts –First and second mean value theorems of integral calculus.

UNIT-IV (16 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:

- Understand the concept of Calculus of variation,Geodesics, Isoperimetric problems.
- Understand the concept of orthogonal curvilinear coordinates .
- Understand the concept of Riemann integrals, fundamental theorem calculus and first and second mean value theorems of integral calculus.
- Learning the concept of Fourier transforms of sine and cosine transforms and their inverse and properties of Fourier transforms.

Text Books/open source materials

- Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
- Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: S Chand and Co. Pvt. Ltd., 2014.
- M D Raisinghania, *Vector calculus*,S Chand Co. Pvt. Ltd., 2013.
- 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.
- www.scilab.org.
- **wxmaxima**.sourceforge.net
- www.geogebra.org

Reference Books:

- R Weinstock,*Calculus of Variation*, Dover, 1970.
- M. D. Raisinghania, *Vector Calculus*, S Chand Co. Pvt. Ltd., 2013.
- G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
- 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

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

(Skill Enhancement Course)

SEC-I (2 Credits / 2 Hours/Week)

Unit:1

Partial Differential Equations- I

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).

Unit: 2

Partial Differential Equations- II

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.

Reference Books:

1. G Strang, MIT open courseware (http://ocw.mit.edu/courses).
2. Frank Ayres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 1972.

3. GF Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.
4. S Narayanan & T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.
5. 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

(Skill Enhancement Course)

SEC-II (2 Credits/2 Hours/ Week)

UNIT- 1: Basics of Graph theory

Basic Definition, Isomorphism, Sub graphs, operations on Graphs ,Walks, paths, Circuits, connected and disconnected graphs , Euler graphs, Hamiltonian graphs, some applications, trees and Basic properties ,Distance, Eccentricity, centre, spanning trees, Minimal spanning tree.

UNIT-II :Cut-Sets,Cut-vertices and Planar Graphs

Cut- sets, Fundamental circuits, fundamental cut-sets, Connectivity, Seperability , Cut-vertex, Network flows,1-and 2- Isomorphisms.Planar and non planar graphs, Euler's formula, Detection of planarity. Matrix representation of graphs- Adjacency matrix of a graph, Incidence matrix of a graph.

Reference Books:

1. C.L Liu –Elements of discrete mathematics McGraw-Hill,1986.
2. Kenneth H.Rosen-Discrete Mathematics and its applications, McGraw-Hill,2002.
3. F. Harary –Graph theory,Addison Wesley,Reading Mass,1969.

4. K.R. Parthasarathy-Basic Graph theory,Tata McGraw-Hill, New Delhi,1994.
5. D.B West –Introduction to Graph theory, Pearson Education inc, 2001,2nd Ed

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

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 PROGRAMS

1. Examples on different types of rings.
2. Examples on integral domains .
3. Examples on Fields.
4. Examples on subrings, ideals and subrings which are not ideals.
5. Finding units and associates.
6. Homomorphism and isomorphism of rings- illustrative examples.
7. Solving polynomial rings.
8. Scilab/Maxima programs to evaluate integrals using Simpson's $\frac{1}{3}^{rd}$ rule.
9. Scilab/Maxima programs to evaluate integrals using Simpson's $\frac{3}{8}^{th}$ rule.
10. Solving algebraic and transidental equation by Bisection method.
11. Solving algebraic and transidental equation by Regula Falsi Method.
12. Solving algebraic equation and transidental equation by Newton raphson Method.
13. Solving ordinary differential equation by Modified Euler's Method.
14. Solving ordinary differential equation by Runge –kutta Method of 4th 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.

PRACTICALS –VI

Mathematics practicals with FOSS tools for computer programs

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

Programs using Scilab/Maxima/Python.

SIXTH SEMESTER

Paper-VII (64 hours)

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

UNIT-I (16 HOURS)

Complex Analysis

a) <u>Complex numbers</u> -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 (16 HOURS)

b) <u>Complex integration</u>- 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.

UNIT-III (16 HOURS)

Linear Algebra-I

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 –Theorems– Basis and dimensions– Standard properties – Examples illustrating concepts and results

UNIT-IV (16 HOURS)

Linear Algebra-II

Linear transformations – properties –Isomorphism – matrix of a linear transformation – Algebra of linear transformation – Eigen Values and Eigen vectors of linear transformation-range and kernel – rank and nullity – Rank – Nullity theorem – Non-singular and singular linear transformations - Standard properties – Examples.

Expected Learning Out Come:

- Understand the fundamental concepts of complex analysis and the role in modern mathematics.
- Compute complex integration and its applications.
- Get the concept of Vector space and subspaces , Homomorphism and Isomorphism of vector spaces.
- Understand the concept of Linear transformations and its properties, rank –nullity, Singular –non singular transformation,and Examples.

Text Books/open source materials

a. S Shanthinarayan, *Complex Analysis*, S Chand Co. Pvt. Ltd., 2012.
b. 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.

c. www.scilab.org
d. **wxmaxima**.sourceforge.net
e. 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.

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 – VIII(64 hours)

(4 lecture hours per week+ 4 hours of practical's /week per batch of not more than 20 students)

UNIT-I(16 hours)

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.

UNIT-II(16 hours)

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(16 hours)

Transformations

Definition-Jacobean of a transformation-Identity transformation-Reflection-

Translation- rotation- magnification and inversion –Linear transformation-Definition- The

bilinear transformation (B.T.)-cross ratio of four points- cross ratio of preserving property-Preservation of family of straight lines and circles-Conformal mapping-Discussion of transformations w = e^z, w=z^2, w =cos z, w =sin z , w =sinh z and w=cosh z.

UNIT-IV(16 hours)

Improper Integrals

Improper Integrals (definition only)- Gamma and Beta functions and results following the definitions-connection between Beta and Gamma functions-applications to evaluation of integrals-Duplication formula.

Expected Learning Out Come:

- Understand the concepts of maxima and minima of functions of two variables.
- Understand the concepts of scalar and vector fields, Harmonic functions.
- Get the concept of transformations,Bilinear transformations,conformal mapping.
- Understand the concept of Beta and Gamma functions, properties.

Reference Books

- S Shanthinarayan, *Complex Analysis*, S Chand Co. Pvt. Ltd., 2012
- R V Churchil & J W Brown, *Complex Variables and Applications*, 5th ed.: McGraw Hill Companies., 1989.
- L V Ahlfors, *Complex Analysis*, 3rd ed.: Mc Graw Hill. , 1979.
- A R Vashista, *Complex Analysis*, Krishna Prakashana Mandir,2012.
- M. D. Raisinghania, *Vector Calculus,* S Chand Co. Pvt. Ltd., 2013.
- G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
- Shanthinarayan and P.K. Mittal – Integrtal calculus.

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

(Skill Enhancement Course)

SEC-III (2 Credits /2 hours /Week)

UNIT: 1

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. Triple integral and evaluation of change of variables.

UNIT-II

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.

Reference Books

1. B.S Grewal – Higher Engineering Mathematics.
2. E. Kreyszig – Advanced Engineering Mathematics.
3. S. C . Malik – Real Analysis.
4. Shanthinarayan and P.K. Mittal – Integrtal calculus.

(Skill Enhancement Course)

SEC-IV (2 Credits/2 Hours /Week)

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 chand &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 20 students)

LIST OF PROGRAMS

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. Examples connected with Cauchy's integral theorem.
6. Vector space, subspace – illustrative examples.
7. Expressing a vector as a linear combination of given set of vectors.
8. Examples on linear dependence and independence of vectors.
9. Basis and Dimension – illustrative examples.
10. Verifying whether a given transformation is linear.
11. Finding matrix of a linear transformation.
12. Problems on rank and nullity 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.

PRACTICALS –VIII

Mathematics practicals with FOSS tools for computer programs

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

Programs using Scilab/Maxima/Python.

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,D and E 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

Rings & Fields and Numerical analysis

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 2 marks:

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

SECTION-B

(Rings & Fields)

Answer any TWO main question. Each question carries 12 marks:

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

SECTION-C

(Numerical analysis)

Answer any TWO main questions. Each question carries 12 marks:

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

SECTION –D

(Rings & Fields and Numerical analysis)

Answer any ONE main question. Each question carries 12 marks:

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

CALCULUS, ORTHOGONAL CURVILINEAR CO-ORDINATES, RIEMANN INTEGRATION AND FOURIER TRANSFORM

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 2 marks:

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

SECTION-B

(CALCULUS OF VARIATION, ORTHOGONAL CURVILINEAR CO-ORDINATES)

Answer any TWO main question. Each question carries 12 marks:

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

SECTION-C

(RIEMANN INTEGRATION AND FOURIER TRANSFORM)

Answer any TWO main questions. Each question carries 12 marks:

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

SECTION –D

(CALCULUS, ORTHOGONAL CURVILINEAR CO-ORDINATES, RIEMANN INTEGRATION)

Answer any ONE main question. Each question carries 12 marks:

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 Linear Algebra

Time : 3 Hours **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 2 marks:

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

SECTION-B

(Complex Analysis)

Answer any TWO main questions. Each question carries 12 marks:

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

SECTION-C

(Linear Algebra)

Answer any TWO main questions.Each question carries 12 marks:

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

SECTION –D

(Complex Analysis and Linear Algebra)

Answer any ONE main question. Each question carries 12 marks:

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

Differential Calculus, Scalar & Vector Fields, Transfomations and Improper Integrals

Time : 3 Hours **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

(Differential Calculus,Scalar & Vector Fields)

Answer any TWO main questions. Each question carries 12 marks:

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

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

SECTION-C

(Transfomations and Improper Integrals)

Answer any TWO main questions. Each question carries 12 marks:

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

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

SECTION-D

(Differential Calculus, Scalar & Vector Fields, Transfomations and Improper Integrals)

Answer any ONE main questions. Each question carries 12 marks:

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

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

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Fifth Semester B.Sc Examination

MATHEMATICS

SEC- I : Partial Differential Equations

Time : 2 Hours **Max.Marks:40**

Instructions: 1.Section A is compulsory.

2.All questions in section B carry equal marks.

SECTION-A

Answer any FIVE questions. Each question carries 2 marks:

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

SECTION-B

Answer any TWO main questions. Each question carries 15 marks.

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

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Fifth Semester B.Sc Examination

MATHEMATICS

SEC-II : Basics of Graph theory

Time : 2 Hours **Max.Marks:40**

Instructions: 1.Section A is compulsory.

2.All questions in section B carry equal marks.

SECTION-A

Answer any FIVE questions. Each question carries 2 marks:

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

SECTION-B

Answer any TWO main questions.Each question carries 15 marks.

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

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Sixth Semester B.Sc Examination

MATHEMATICS

SEC-III : Line & Multiple intrgrals, Integral Theorems

Time : 2 Hours **Max.Marks:40**

Instructions: 1.Section A is compulsory.

2.All questions in section B carry equal marks.

SECTION-A

Answer any FIVE questions. Each question carries 2 marks:

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

SECTION-B

Answer any TWO main questions. Each question carries 15 marks.

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

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Sixth Semester B.Sc Examination

MATHEMATICS

SEC-IV : Optimization, Linear Programming

Time : 2 Hours **Max.Marks:40**

Instructions: 1.Section A is compulsory.

2.All questions in section B carry equal marks.

SECTION-A

Answer any FIVE questions. Each question carries 2 marks:

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

SECTION-B

Answer any TWO main questions.Each question carries 15 marks.

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