

# Govt. College for Women Parade, Jammu

The Examination to be held in the Session 2017, 2018, 2019, 2020 & 2021.

## Core courses BA/BSC/BCA(Prog.)Mathematics

### Semester: I

Title: Differential Calculus

Course Number: UMATC-101

### Semester: II

Title: Differential equations

Course Number: UMATC-201

### Semester: III

Title:- Real Analysis

Course Number: UMATC-301

### Semester: IV

Title:- Abstract Algebra

Course Number: UMATC-401

## Discipline Specific Elective (DSE)

### B.A/BSC/BCA (Prog.) Mathematics

### Semester: V

#### **DSE-1**

Title:- Linear Algebra

Course Number: UMATDSE-501

or

#### **DSE -2**

Title:-Matrices

Course Number: UMATDSE-502

### Semester: VI

#### **DSE- 1**

Title:- Numerical Methods

Course Number: UMATDSE-601

#### **DSE -2**

Title:-Complex Analysis

Course Number: UMATDSE-602

## Generic Elective (GE) B.A.(Prog.)MATHEMATICS

### Semester: V

Title: Numerical Ability-I

Course Number: UMATGE-501

### Semester: VI

Title:- Numerical Ability-II

Course Number: UMATGE-601

## Skill Based Papers BA/BSC/BCA (Prog.) MATHEMATICS

### Semester: III

Title:- Logics ,Sets and Relation

Course Number: UMATS-301

### Semester: IV

Title:- Vector Calculus

Course Number: UMATS-401

### Semester: V

Title:- Probability and statistics

Course Number: UMATS-501

### Semester: VI

Title:- Analytical Geometry

Course Number: UMATS-601

# GOVT. COLLEGE FOR WOMEN, PARADE GROUND JAMMU.

## AN AUTONOMOUS COLLEGE

### Core Course

Syllabus : Semester-I (CBCS) BA/Bsc./BCA Mathematics

**TITLE:** Differential Calculu

**TIME DURATION:**

**Sessional Exam : 1 hr**

**External Exam: 3 hr**

**CREDITS: 06**

**TOTAL MARKS: 150**

**Sessional Assignment: 30**

**External Exam: 120**

**Unit:1** Limit and continuity of function on  $\mathbb{R}$  ( $\epsilon$ - $\delta$  definition) Differentiability of functions, successive differentiation and Leibnitz's Theorem for  $n^{\text{th}}$  derivative of product of two functions.

**Unit:2** Partial differentiation, Euler's theorem on homogeneous functions, Maxima and Minima of functions of two variables.

**Unit:3** Envelopes, Asymptotes, Double point and Curve tracing in Cartesian coordinates.

**Unit:4** Polar coordinates, Relation between Cartesian coordinates and Polar coordinates. Graphic Techniques in Polar forms for the curves.  $r=a(1\pm\cos\theta)$ ,  $r=a(1\pm\sin\theta)$ ,  $r=a\cos n\theta$ ,  $r=a\sin n\theta$  for  $n= 1,2$  only.

**Unit:5** Rolle's Theorem, The Mean value theorems, Taylor's Theorem with Lagrange's and Cauchy's form of remainder. Taylor's series and Maclaurin's series of  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $\sec x$ ,  $e^x$ ,  $\log(1\pm x)$ ,  $(1+x)^m$ .

### Books Recommended:

1. H. Anton, I Birens and S. Davis, Calculus, John Wiley and Sons, Inc 2002.
2. G.B Thomas and RL Finney, Calculus, Pearson Education, 2007.
3. S. Nayan and PK Mittal, Differential Calculus S. Chand Publisher.

# GOVT. COLLEGE FOR WOMEN, PARADE GROUND JAMMU.

AN AUTONOMOUS COLLEGE

Core Course

Syllabus : Semester-II (CBCS) BA/Bsc./BCA Mathematics

**TITLE:** Differential Equation

**TIME DURATION:**

**Sessional Exam : 1 hr**

**External Exam: 3 hr**

**CREDITS: 06**

**TOTAL MARKS: 150**

**Sessional Assignment: 30**

**External Exam: 120**

**Unit:1** Linear and Bernoulli's equations, Exact and nonexact differential equations, Differential equation solvable for p only Clairaut's equation.

**Unit:2** Differential equations of 2<sup>nd</sup> and 3<sup>rd</sup> order with constant coefficients of the Type  $f(D)y=g(x)$ , where  $g(x)=e^{ax}$ ,  $\cos ax$ ,  $\sin ax$ ,  $x^n$ . Their sum and products in pairs.

**Unit:3** Wronskian and its properties. Solution of differential equations by reducing its order, method of variation of parameters, Cauchy-Euler Equations.

**Unit:4** Partial differential equations, formation of PDE. Lagrange's method, Charpit's method.

**Unit:5** Homogeneous and non homogeneous. Linear partial differential equations of 2<sup>nd</sup> and 3<sup>rd</sup> order with constant coefficients of the type  $f(D_x, D_y)z=g(x,y)$  where  $g(x,y)=e^{ax+by}$ ,  $\cos(ax+by)$ ,  $\sin(ax+by)$ ,  $x^m y^n$ ,  $v e^{ax+by}$ , where v is function of x, y and their sums.

**Books Recommended:**

1. Differential Calculus by Shanti Narayan and P.K Mittal. S. Chand Publisher.
2. SL Ross. Differential equation Blaidell Publication 1994.
3. Elements of Partial differential Equations I Sneddon Mc Graw-Hill.

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**GOVT. COLLEGE FOR WOMEN, PARADE GROUND JAMMU.**

**AN AUTONOMOUS COLLEGE**

**Core Course**

**Syllabus : Semester-III (CBCS) BA/Bsc./BCA Mathematics**

**TITLE: Real Analysis**

**TIME DURATION:**

**Sessional Exam : 1 hr**

**External Exam: 3 hr**

**CREDITS: 06**

**TOTAL MARKS: 150**

**Sessional Assignment: 30**

**External Exam: 120**

**Unit-I**

Finite and infinite sets, examples of countable & uncountable sets, Real Line, bounded sets, suprema and infima, completeness property of real numbers, Archimedean property of  $\mathbb{R}$ , intervals, concept of cluster points and statement of Bolzano-weierstrass theorem.

**Unit-II**

Real Sequence, Bounded sequence, Cauchy convergence Criterion for sequences, Cauchy's theorem on limits, order preservation and Squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof) Nested Interval Theorem.

**Unit-III**

Infinite series, Cauchy convergence Criterion for series, positive term series, geometric series, comparison test, convergence of p-test, Root test, Ratio test, Raaber's Test, alternating series, Leibnitz's test (tests of convergence without proof). Definition and examples.

**Unit-IV**

Sequences and series of functions Point wise and uniform convergence,  $M_n$ -test, M-test.

**Unit-V**

Results of uniform convergence and integrability and differentiability of functions, Power series and Radius of Convergence.

**Books Recommended**

1. T.M Apostol, Calculus (Vol.1) John Wiley and Sons (Asia) P. Ltd., 2002.
2. R.G Baste and D.R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2002.
3. E. Fischer, intermediate Real Analysis, Springer Verlag, 1983.
4. K.A Ross, Elementary Analysis- The theory of calculus series-Undergraduate Texts in Mathematics, Springer verlag, 2003.

# GOVT. COLLEGE FOR WOMEN, PARADE GROUND JAMMU.

## AN AUTONOMOUS COLLEGE

### Core Course

#### Syllabus : Semester-IV (CBCS) BA/Bsc./BCA Mathematics

**TITLE:** Abstract Algebra

**TIME DURATION:**

**Sessional Exam : 1 hr**

**External Exam: 3 hr**

**CREDITS: 06**

**TOTAL MARKS: 150**

**Sessional Assignment: 30**

**External Exam: 120**

#### **Unit-I**

Definition and examples of groups, abelian and non-abelian groups, the group  $Z_n$  of integers under addition modulo  $n$  and the group  $U(n)$  of units under multiplication modulo  $n$ , Cyclic groups, the permutation group  $\text{sym}(n)$ , Group of quaternions.

#### **Unit-II**

Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group.

#### **Unit-III**

Costs, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups, their definition, examples and characterizations, quotient groups.

#### **Unit-IV**

Definition and examples of rings, examples of commutative and non-commutative rings, rings from number systems,  $Z_n$ , the ring of integers modulo  $n$ , ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions. Integral Domain, Field.

#### **Unit-V**

Subrings, Ideals, Quotient rings, ring Homomorphism, Fundamental Theorem of Ring Homomorphism.

#### **Books Recommended**

1. John B. Fraleigh, A First course in Abstract Algebra, 7<sup>th</sup> Edition., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2<sup>nd</sup> Ed., Pearson, 2011.
3. Joseph A Gallian, contemporary Abstract Algebra, 4<sup>th</sup> Ed. Narosa, 1999.
4. George E Andrews, Number Theory, Hindustan Publishing corporation, 1984.

# Govt. College For Women Parade Jammu (An Autonomous College)

Syllabus:- Semester V (CBCS)  
DSE  
Title:- Linear Algebra  
Course Number :- UMATDSE-501

(Mathematics)  
Credits  
Total Marks:- 150  
Sessional Assessment:- 30  
External Examination:- 120

Unit I :- Linear space, Subspace, Algebra of sub sub spaces, Quotient spaces, Linear combination, Linear Span, Linear dependence and Linear Independence Vectors, Exercise and results based in these topics.

Unit II :- Basis and Dimension of a vector space, Existence theorem Extension Theorem, Sum space and Quotient space. Results and exercise based on these topics.

Unit III :- Linear transformation and its properties, Kernel Space, Range space of linear transformation, Sylvester's law of nullity, Matrix representation of linear transformation. Results and exercise based on these topics.

Unit IV :- Definition of linear algebra, Algebra of linear transformation, Dual space, Homomorphism, Isomorphism of a linear transformation, Isomorphism theorems, change of a Co-ordinate matrix, Results and exercise based on these topics.

Unit V :- Matrices: Sum and Product of matrices, Transpose, Conjugate and Tranjugate of a matrix, Types of matrices-symmetric, skew-symmetric, hermitian , skee hermitian , orthogonal and unitary; Rank of a matrix, Characteristic polynomial and characteristics equation, Characteristics values and vectors. Cayley-hamilton Theorem and its application to find the inverse

## Text Books:-

1. K.P. Gupta, Linear Algebra
2. Gopala Krishnan, N.S. University of algebra, New- age International
3. Halfman, K. And Kunze, R, Linear Algebra, Prentice-Hall Inc.
4. Lipschutz, Schaum's outlines linear Algebra.
5. Biswas, A text book of matrix Algebra, New age International.
6. Halmas, P.R., Finite Dimensional Vector space.

**Govt. College For Women Parade Jammu  
(An Autonomous College)**

**Discipline Specific Elective**

Syllabus: Semester V (CBCS) BA/BSC/BCA	(Mathematics)
Title: Matrices	Credits: 06
Time Duration	Total Marks: 150
Sessional exam: 1hr	Sessional Assessment: 30
External exam: 3hr	External exam: 120

**Unit I:**  $\mathbb{R}^n$  ( $n=2,3,\dots$ ) as vector space over Real, Subspaces of  $\mathbb{R}^3$ , Linear space, Basis and Dimension of a vector space, Linear transformation, vectors, Linear dependent and independent vectors, related examples on these concepts.

**Unit II:** Translation, dilation, rotation, reflection of point, line and plane; matrix form of basic geometric transformations, Interpretation of eigen values and eigen vectors for such transformations.

**Unit III:** Types of matrices: transpose and trace of a matrix, symmetric, skew-symmetric, hermitian, skew-hermitian, orthogonal and unitary matrices. Rank of matrix, elementary transformations, elementary matrices, inverse of a matrix by use of elementary transformation, matrix reduced to normal forms.

**Unit IV:** System of linear equations (homogeneous and non-homogeneous), Augmented Matrix, solution of system of linear equation by rank method, Gauss- Elimination method, partitioning of matrices and inverse by partitioning. Examples of these methods.

**Unit V:** Cayley- Hamilton theorem, Inverse of matrix by Cayley- Hamilton theorem, Eigen values and eigen vectors of a matrix, Diagonalization of a  $3 \times 3$  matrix.

**Books Recommended:**

1. A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984

2. Richard Bronson, Theory and Problems of Matrix operation Tata Mc Graw Hill, 1989.
3. Anthony J. Pettafrezzo: Matrices and Transformations, Dover Publication revised Edition 1978.
4. Serre, Denis- Matrices Theory and Applications, Springer Verlag New York Publication Edition 2002.
5. S.H. Friedberg, A.L. Insel and L.E. Spence, Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.



**Govt. College for Women Parade Jammu  
(An Autonomous College)**

**Discipline Specific Elective**

Syllabus: Semester VI (CBCS) BA/BSC/BCA (Mathematics)

Title: Complex Analysis

Credits: 06

Time Duration

Total Marks: 150

Sessional exam: 1hr

Sessional Assessment: 30

External exam: 3hr

External exam: 120

**Unit I:** Algebra of complex numbers, Roots of a Complex number, Expansion of  $\sin(n\theta)$ ,  $\cos(n\theta)$ ,  $\sin^n(\theta)$ ,  $\cos^n(\theta)$ , and their products in terms of  $\sin(\theta)$ ,  $\cos(\theta)$ . Function of a complex variable  $f(z)$ , Region in complex plane, Hyperbolic functions of  $z$ , Relation between hyperbolic and circular functions; limit, continuity and derivatives of a function  $f(z)$ .

**Unit II:** Cauchy- Riemann equations, Analytic functions with examples of exponential functions, logarithmic functions, trigonometric functions, harmonic functions, CR equations in polar form, NASC for a function to be analytic, Milne- Thomson method to determine  $f(z)=u+iv$ , when  $u$  (or  $v$ ) is given, standard transformations with simple examples.

**Unit III:** Complex integration, Cauchy-Goursat theorem, Cauchy's integral formula, Cauchy's integral formula for derivatives, Cauchy's inequality, Examples on these topics.

**Unit IV:** Liouville's theorem, fundamental theorem of algebra, Convergence of a series in complex form, Taylor's series theorem, Laurent's series theorem with simple examples.

**Unit V:** Singularities and its types, Residues and its method of calculation, Cauchy's residue theorem, Application of residue theorem to evaluate real integrals of the form  $\int_0^{2\pi} f(\sin\theta, \cos\theta)d\theta$ .

Simple examples on these topics.

**Books Recommended:**

1. S. Ponnusamy : Foundations of complex analysis Narosa, publications House 1997.
2. Shanti Narayan : Theory of functions of a complex variable, S. Chand and company Ltd New Delhi, 2001
3. Schuam's, Outlines of Complex variable, Mc Graw Hill Education, 2<sup>nd</sup> Edition 2009.
4. Theodore W. Gamelin: Complex Analysis, Springer Berlin, Heidelberg, New York, 2001.
5. Complex Analysis: L.V. Ahlfors, Mc Graw Hill New York, 3<sup>rd</sup> Edition 1979.
6. Real and complex Analysis: W. Rudin Mc Graw Hill Education 1987.

**Govt. College for Women Parade Jammu  
(An Autonomous College)**

**Discipline Specific Elective**

Syllabus: Semester VI (CBCS) BA/BSC/BCA (Mathematics)

Title: Numerical methods

Credits: 06

Time Duration

Total Marks: 150

Sessional exam: 1hr

Sessional Assessment: 30

External exam: 3hr

External exam: 120

**Unit I:** Finite difference and operators, forward and backward difference, shift, Average and Central difference operators, their properties and relation between them, factorial polynomial, Newton's forward and backward interpolation, missing terms, Lagrange's interpolation and inverse interpolation.

**Unit II:** Central difference interpolation: Gauss's forward and backward interpolation, Bessel, Stirling, Everett formulas, problems based on these topics.

**Unit III:** Newton's divided difference interpolation, Numerical differentiation- Newton's forward and backward interpolation, Newton's divided difference interpolation, Bessel and Stirling formulas, Exercises based on these concepts.

**Unit IV:** Numerical Integration: Newton-Cotes quadrature formula, Trapezoidal rule, Simpson's 1/3 and 3/8 rules, Boole's and Weddle's rule. Solving differential equations with particular integral for  $a^n$ ,  $n^p$ ,  $\sin kn$ ,  $\cos kn$  and  $a^n n^p$ .

**Unit V:** Solution of algebraic and Transcendental equations- Descartes's rule of signs, bisection method, false position method, direct iteration method. Newton-Raphson method, Secant method.

**Books Recommended:**

1. Dr. B.S Grewal- Numerical method, Khanna Publication, 42<sup>th</sup> Edition, 2012.
2. Dr. Sudhir K. Pundir Finite difference and Numerical Analysis, 1<sup>st</sup> Edition.
3. B. Bradie, A friendly Introduction to Numerical Analysis, Pearson Education, India 2007.
4. M.K Jain, S.R.K iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 5<sup>th</sup> Ed, New age International Publisher, India, 2007.
5. E. Balagurusamy, Numerical Methods, mc Graw Hill Education (India) Pvt. Ltd. 2013

**AN AUTONOMOUS COLLEGE**  
**Skill Enhancement Courses**

**Syllabus : Semester-III (CBCS) BA/Bsc./BCA Mathematics**

**TITLE: Logic, Sets & Relation**

**TIME DURATION:**

**Sessional Exam : 1 hr**

**External Exam: 3 hr**

**CREDITS: 04**

**TOTAL MARKS: 100**

**Sessional Assignment: 20**

**External Exam: 80**

**Unit-I**

Introduction, Propositions, Truth table, Negation, conjunction and Disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence. Logical equivalences, Predicates and Quantifiers. Introduction.

**Unit-II**

Sets, subsets, set operations, the laws of set theory and venn diagrams. Finite set and Infinite set. Counting principals, empty set, properties of empty sets, Problems based on these topics.

**Unit-III**

Standard set operations, classes of sets, power set of a set. Difference and symmetric difference of two sets, set identities, generalized union and intersection of sets.

**Unit-IV**

Relation: Product set composition of relations, types of relations, partitions relation, equivalence relations with examples of congruence modulo relation.

**Books Recommended**

1. R.P Grimaldi, Discrete mathematics and Combinatorial Mathematics, Pearson Education, 1988.
2. P.R. Halmos, Naïve set theory, springer, 1974.
3. E. Kamke, Theory of sets, Dover publishers, 1950.

# **GOVT. COLLEGE FOR WOMEN, PARADE GROUND JAMMU.**

## **AN AUTONOMOUS COLLEGE**

### **Skill Enhancement Courses**

#### **Syllabus : Semester-IV (CBCS) BA/Bsc./BCA Mathematics**

**TITLE: Vector Calculus**

**TIME DURATION:**

**Sessional Exam : 1 hr**

**External Exam: 3 hr**

**CREDITS: 04**

**TOTAL MARKS: 100**

**Sessional Assignment: 20**

**External Exam: 80**

#### **Unit-1**

Vectors, addition of vectors, scalar product, vector product, vector valued function, limit of a vector valued function, continuity and Derivative of a vector valued function at a point. Constant vector or constant vector valued function, Theorem based on these concepts.

#### **Unit-2**

Partial derivatives of a vector valued function, Derivatives of sum, dot product, cross product of two vectors.

#### **Unit-3**

Scalar point function, vector point function, vector differential operator and Directional derivatives.

#### **Unit-4**

Gradient, Divergence, Curl and line integral Examples and problems based on these topics.

#### **Books Recommended:-**

1. Vector Calculus by Shanti Narayan & PK Mittal, S. Chand publisher.
2. G B Thomas and RL Finney, Calculus, 9<sup>th</sup> edition pearson education, Delhi 2005.
3. PC Mattew's Vector Calculus, Springer Verlag London Limited 1998.
4. H Anton I Bivens & S Davis, Calculus, John Wiley & Sons (Asia) Pvt, Ltd. 2002.

**Govt. College for Women Parade Jammu  
(An Autonomous College)**

**Skill Enhancement Course**

Syllabus: Semester V (CBCS) BA/BSC/BCA	(Mathematics)
Title: Probability & statistics	Credits: 04
Time Duration	Total Marks: 100
Sessional exam: 1hr	Sessional Assessment: 20
External exam: 3hr	External exam: 80

**Unit I: Probability distribution**

Random variable (continuous and discrete), Probability function and Probability density function, Distribution Function and its properties, types of distribution: Discrete, Continuous, Construction of a probability distribution, Bernoulli distribution, Conditions to be satisfied by a certain function in order that it may be a probability function or a probability density of a certain distribution.

**Unit II: Expectations and moments**

Expectation of a random variable (continuous and discrete). Expectation  $E[X-a]^r$  and  $E[X-E[x]]^r$  ( $r=1,2,3$ ) where  $a$  is any arbitrary point. Relation between the moments about the mean in terms of any point and vice versa. Moment generating function mgf and its properties, Addition and multiplication theorem of expectation for two random variables, Mean variances and mgf of bernolli distribution.

**Unit III:**

**Binomial distribution**

Mean, variance, mgf and Mode of the Binomial distribution, measure of skewness and kurtosis. Mean variance and mgf of standard binomial variate  $Z=$

$$\frac{X-np}{\sqrt{npq}}$$

**Poisson Distribution**

Mean, Variance and mgf, Poisson distribution as a limiting case of binomial distribution, measure of skewness and kurtosis, Mean, variance and mgf of standard poisson varaitè  $Z=(X-\lambda)/\text{sqrt}(\lambda)$ .

**Unit IV : Normal Distribution**

Definition, Mean, Variance, and mgf, Properties of Normal Curve, Mean, variance and mgf of standard normal variate  $Z = (X - \mu) / \sigma$ . Normal Curve as a limiting case of binomial and poisson distribution. Simple Problems, Distribution of mean and 95% confidence interval.

Gamma distribution: Mean, variance and mgf.

### **Recommended Books**

1. Sharma, H.S. Sharma, G.C and Choudhary SS, A text book of numerical Analysis, Ratan Prakasham Mandir, Agra
2. Kapur J.N. Saxsena, H.C., Mathematical Statistics, S.Chand and Co.
3. S.C.Gupta and K Kapoor Fundamental of Statistics, S. Chand and Co. Edition 1.
4. Bajaj, C.P. and Gupta, P.N. Elements of Statistics, R. Chand and Co.
5. Hoel, P.G., Introduction to Mathematical Statistics, John Wiley and Sons.



**Govt. College for Women Parade Jammu  
(An Autonomous College)**

**Skill Enhancement Course**

Syllabus: Semester VI (CBCS) BA/BSC/BCA (Mathematics)

Title: Analytical Geometry

Credits: 04

Time Duration

Total Marks: 100

Sessional exam: 1hr

Sessional Assessment: 20

External exam: 3hr

External exam: 80

**Unit I: Circle**

Radius and centre, standard form, general form, parametric form, equation of a circle when the end points of its diameter are given, Point of intersection of a line and a circle with centre at origin, condition for a line to be tangent to the given circle, equation of a tangent to the circle and length of a tangent.

**Unit II: Parabola**

Focus, Directrix, Eccentricity, Axis, Vertex, Centre, Double ordinate, latus Rectum, Standard forms of Parabola, find equations of Parabola when vertex and directrix/focus are given and vice-versa. Equation of normal and tangent at a point to a parabola, curving tracing of a parabola.

**Unit III: Ellipse**

Vertices, Foci, Major and Minor axes, Directrices, Centre, eccentricity, Ordinate, Double Ordinate, Latus Rectum, Equation of Ellipse, Equation of Ellipse, when its focus, Vertices, Directrix and Eccentricity are given and Vice-versa. Equation of normal and tangent to an ellipse, Curve tracing.

**Unit-IV: Hyperbola**

Hyperbola and its various elements. Finding equation of hyperbola when some of its parts are given and Vice-versa, Curve tracing.

**Books Recommended:-**

1. Dr. Ravi Dutt Sharma Mathematics XI, Dhanpat Rai Publications (P).

2. G.B. Thomas and R.L. Finney, Calculus, 9<sup>th</sup> Ed, Pearson Education, Delhi, 2005.
3. S.L. Loney, The Elements of Co-ordinate Geometry, Mc Millan and Company, London.
4. H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons (Asia) Pvt. Ltd. 2002.
5. M.R.Puri Co-ordinate Geometry Malhotra Brother, Educational Publisher Edition 1989.
6. A.k.Roy XI Mathematics Volume I Published in Coperation with J&k Board of School Education.

# Govt. College For Women Parade Jammu (An Autonomous College)

Syllabus:- Semester V (CBCS)  
Title:- Numerical Ability-I  
Course Code :- UMATGE-501

(Mathematics) Generic Course  
Credits- 4  
Total Marks:- 100  
Internal Assessment:- 20  
External Examination:- 80

Unit I :- Decimal fraction and simplification, Number system, Square and square roots, Cube and cube roots, HCF and LCM

Unit II :- Indices and Surds, theory of equations, Ratio and proportion, Average.

Unit III :- Ratio and Proportion, Average, Linear Equations in two variables( Four methods, Graphical Method, Substitution method, Comparison method, Cross multiplication), Arithmetic Progression

Unit IV :- Introduction to Trigonometry, Trigonometric Identities, Application of Trigonometry in finding heights and distances

Books Recommended:-

1. R.S. Aggarwal, Quantitative Aptitude, 2001
2. Rakesh Yadav, Advanced maths for general competitions

# **Govt. College For Women Parade Jammu**

## **(An Autonomous College)**

Syllabus:- Semester V (CBCS)  
Title:- Numerical Ability-II  
Course Code :-UMATGE-601

(Mathematics) Generic Course  
Credits- 4  
Total Marks:- 100  
Internal Assessment:- 20  
External Examination:- 80

Unit I :- Percentage, Profit and Loss, Simple and Compound Interest.

Unit II :- Unitary method, time and work, time and distance.

Unit III :- Surface area and Volume, Co-ordinate Geometry (Section Formula , Distance Formula, Area of Triangle)

Unit IV :- Probability, Statistics (Bar graph, Histogram, Pie Chart), Data Interpretation.

Books Recommended:-

1. R.S. Aggarwal, Quantitative Aptitude, 2001
2. Rakesh Yadav, Advanced maths for general competitions.

**OFFICE OF THE PRINCIPAL, GOVT. COLLEGE FOR WOMEN  
PARADE GROUND, JAMMU.**

**CORE COURSE/ DISCIPLINE SPECIFIC ELECTIVE**

**INSTRUCTIONS FOR PAPER SETTERS AND CANDIDATES  
FOR EXTERNAL EXAMINATION**

The question paper for semester end examination will be of 120 marks and consist of three sections:

**Section A(30 marks)**

Five short answer type questions of 6 marks each, one from each unit. All questions will be compulsory.

**Section B(50 marks)**

Five medium answer type questions of 10 marks each, one from each unit. All questions will be compulsory.

**Section C (40 marks)**

Five long answer type questions of 20 marks each, one from each unit. Each question will have two parts. The students will have to attempt any two questions.

**FOR INTERNAL ASSESSMENT:**

The internal assessment will be of thirty marks in which 7.5 marks are for attendance & 22.5 marks for internal test.

The test will comprise of eight questions of 4.5 marks each from 50% of the syllabus covered and candidate will have to attempt any five.

**SKILL ENHANCEMENT COURSE**

**Instructions for paper setters and candidates**

**For External Examination:**

The question paper for semester end examination will be of 100 marks and consist of three sections:

**Section A(16 marks)**

Four short answer type questions of 4 marks, each one from each unit. All questions will be compulsory.

**Section B (28 marks)**

Four medium answer type questions of 7 marks each, one from each unit. All questions will be compulsory.

**Section C(36 marks)**

Four long answer type questions of 18 marks each, one from each unit. Each question will have two parts. The students will have to attempt any two questions.

**FOR INTERNAL ASSESSMENT:**

The Internal Assessment will be of 20 marks in which 5 marks are for attendance and 15 marks for internal test.

The test will comprise of eight questions of 3 marks each from 50% of the syllabus covered & candidate have to attempt any five.

# G.C.W. Parade (Autonomous College) (Non CBCS)

## Syllabus

B.A / B.Sc / B.C.A

Semester – I

Calculus

Semester Examination: 80 Marks

Sessional Assessment: 20 Marks

Time: 3 hours

### Unit – I

Functions of two variables, their limit and continuity. Partial derivatives and Euler theorem for homogeneous functions. Their derivatives and equality of  $f_{xy}(x,y)$  and  $f_{yx}(x,y)$ . Double points, Maxima, Minima in two variables.

### Unit – II

Asymptotes in Cartesian forms, Envelopes of one and two parameter family of curves, Curvature, radius of curvature of Cartesian curve, parametric curve and implicit function, radius of curvature at origin, centre of curvature., Curve tracing in Cartesian co-ordinates.

### Unit – III

Ordinary and partial derivatives of vector-valued functions, Directional derivatives of vector-valued functions of several variables, the operator  $\nabla$ , Gradient of scalar function, divergence and curl of vector functions, second order derivative of vector valued functions, the Laplacian operator operator  $\nabla^2$ , Line integral.

### Unit – IV

Polar coordinates and their relationship with Cartesian co-ordinates, Angle between radius vector and tangent at a point on the curve and the angle of intersection of two curves, curve sketching in polar co-ordinates such as  $r = a + b \cos \theta$ ,  $a + b \sin \theta$ ,  $a \cos n \theta$ ,  $a \sin n \theta$ . (for  $n = 2$  and  $3$  only).

### Unit – V

Reduction formulae of  $\int \sin^n x dx$ ,  $\int \cos^n x dx$ ,  $\int \tan^n x dx$ ,  $\int \cot^n x dx$ ,  $\int \sec^n x dx$ ,  $\int \operatorname{cosec}^n x dx$ ,  $\int \sin^p x \cos^q x dx$ , Rectification of plane curve in cartesian form only, Volume and surface of revolution of curves in cartesian form.

### Text Book:

1. Differential Calculus by Shanti Naryan, Dr. P.K. Mittal, Publisher S.Chand
2. Vector Calculus by Shanti Naryan, Dr. P.K. Mittal, Publisher S. Chand
3. Integral Calculus by Shanti Naryan, Dr. P.K. Mittal, Publisher S. Chand
4. Calculus and differential Equations by V.K. Bhandari and O.P. Arora, Publisher S. Dinesh & Co.

### Note

1. The question paper will contain two questions from each unit (total ten questions) and the candidates will be required to answer one question from each unit (total question to be attempted, will be five i.e. there will be internal choice within each unit.
2. There should be minimum 75 lectures for the completion of syllabus where each lecture will be of One hour duration

# G.C.W. Parade (Autonomous College)

## Syllabus

B.A / B.Sc / B.C.A

### Semester – II

## Differential Equations and Three Dimensional Geometry

Semester Examination: 80 Marks  
Sessional Assessment: 20 Marks  
Time: 3 hours

#### Unit – I

Linear and Bernoulli's differential equations, Exact and non – exact differential equations, Differential equation. Differential equations solvable for p and Clairauts differential equation. Examples, problems based on these topics.

#### Unit – II

Differential equations of 2<sup>nd</sup> and 3<sup>rd</sup> order with constant coefficients of the type  $f(D)y = g(x)$ , where  $g(x) = e^{ax}, \cos ax, \sin ax, x^n$ , their sum and products in pair. Cauchy Homogenous Linear equations. Problems based on these topics.

#### Unit – III

Partial Differential equations of first order. Linear equations of the form  $Pp + Qq = R$ , Lagrange's method. Non-linear first order equations. Charpit's method. Partial differential equations of second and third orders with constant coefficients. Homogeneous and Non-Homogeneous partial differential equations. Examples and exercises based on these topics.

#### Unit – IV

General equation of sphere, Sphere through four points, Plane section section of a sphere, Intersection of two spheres, with a given diameter, Intersection of a sphere and a line, Equation of tangent plane at any point of the sphere, Angle of intersection of two spheres, condition for the orthogonality of two spheres.

#### Unit – V

Equation of a cone with conic as guiding curve, enveloping cone of a sphere, condition that the given equation of 2<sup>nd</sup> degree should represents a cone, intersection of a line with a cone, tangent plane to a cone at a point, condition for tangency for a plane, reciprocal cone, equation of a right circular cone, equation of cylinder, enveloping cylinder and equation of right circular cylinder.

#### Text Books:

1. Differential Calculus by Shanti Naryan & Dr. P.K. Mittal, Publisher S. Chand
2. S.L. Ross, Differential Equation, Blaidell, Publisher Co. 1994
3. Solid Geometry by Shanti Naryan, Dr. P.K. Mittal, Publisher S. Chand

#### Note

1. The question paper will contain two questions from each unit (total ten questions) and the candidates will be required to answer one question from each unit (total question to be attempted, will be five i.e. there will be internal choice within each unit.
2. There should be minimum 75 lecturers for the completion of syllabus where each lecture will be of One hour duration



# G.C.W. Parade (Autonomous College)

## Syllabus

B.A / B.Sc / B.C.A

Semester – III

Abstract Algebra

Semester Examination: 80 Marks

Sessional Assessment: 20 Marks

Time: 3 hours

### Unit – I: (Logic and set theory)

Sentences and basic sentential connectives. Truth values and truth tables, contradictions, quantifiers, Algebra of sets family of sets, De-Morgan's laws and their generalizations.

### Unit – II: (Relation and function)

Relations and their examples, types of relations, Equivalence relation, Partial order relations, Composition of relations, Inverse of a relation. Functions and their examples, Injective, surjective and bijective functions (maps)

### Group Theory

#### Unit – III

Binary operations, definitions of semigroups and groups with plenty of examples from number systems, matrices and functions, Abelian and non-abelian groups, finite groups, subgroups and their examples, Subgroup generated by a subset, cyclic groups and their properties

#### Unit – IV

Right and left cosets, Normal subgroups and their examples, Quotient groups and their example, Lagrange's theorem and its applications including Euler's theorem and Fermat's theorem.

#### Unit – V

Homomorphisms and Isomorphisms of groups and their examples, Kernel of a homomorphism, First fundamental theorem of homomorphism. Transformation group and Cayley's theorem. Permutation group  $S_n$  of  $n$ , Even and odd permutations, computation of subgroups of  $S_n$  for  $n \leq 3$

#### Text Books:

1. A basic course in Abstract Algebra, Rajendra Kumar Sharma, Sudesh Kumari Shah, Asha Gauri Shankar
2. Algebra by U M Swamy & AVSN Murthy
3. University Algebra by Gopal Krishnan

#### Note

1. The question paper will contain two questions from each unit (total ten questions) and the candidates will be required to answer one question from each unit (total question to be attempted, will be five i.e. there will be internal choice within each unit.
2. There should be minimum 75 lectures for the completion of syllabus where each lecture will be of One hour duration

**Unit – I**

Boundedness of set in real no's, Least upper bound, greatest lower bound of a set, Neighbourhoods, Interior points, Isolated points, Limit points, open sets, closed sets Interior of set. Closure of a set in real no's and their properties. Balzano weirstress theorem, open cover, compact sets and Heine-Borel Theorem.

**Unit – II**

Axiomatic definition of real number system as a complete ordered field, least upper bound property, sequences and their limits, Cauchy's general principle of convergence, uniqueness of limit, Algebra of limits, Bounded and monotonic sequences, Nested interval property. Examples and exercises on these topics.

**Unit - III**

Infinite series and their examples, positive term series, convergence and divergence of series, tests for convergence, p-tests, Comparison test, Ratio, Root and Raabe's tests, Alternating series and Leibnitz tests, Absolute convergence of series. Examples and exercises on these topics.

**Unit – IV**

Definition (and examples) of continuous and discontinuous functions,  $\epsilon$ - $\delta$  definition of continuity with elementary illustrations, uniform continuity, bounded functions, continuity implies uniform continuity on the closed intervals, every continuous function attains its bounds on closed intervals.

**Unit – V**

Differentiable functions and examples, Rolle's theorem, Mean-value theorems (Lagrange's, Cauchy's) and Taylor's Theorem with Lagrange's form of remainder, Taylor's and Maclaurin's series of some functions. Examples and exercises of these topics.

**Text Books:**

1. S.C. Malik: Mathematics Analysis, Wiley Eastern Ltd. Allahabad
2. Shanti Narayan: A course in Mathematic Analysis, S. Chand and company New Delhi
3. R.R. Gold berg: Real Analysis, Oxford & IBH publishing New Delhi.

**Note**

1. The question paper will contain two questions from each unit (total ten questions) and the candidates will be required to answer one question from each unit (total question to be attempted, will be five i.e. there will be internal choice within each unit.
2. There should be minimum 75 lectures where each lecture will be of One hour duration

SYLLABUS

B.A/B.Sc/B.C.A

Semester-V

Linear Algebra

Semester Examination:80 marks

Sessional Assesment:20 Marks

Time:3 hours

Unit 1. The Concept of rings and Fields with examples, Subrings, Ring Homomorphism and their examples, Ideals( left and right) and Quotient ring.

Unit II: Vector spaces, subspaces and Quotient space with examples, Linear dependence and independence of vectors, Linear span.

Unit III : Basis and dimensions of vector spaces, Isomorphic vector spaces, Finite and Infinite dimensional vector spaces, Dual of a finite dimensional vector space.

Unit IV: Linear transformation on vector spaces and their examples. Algebra of linear transformation of a finite dimensional vector space . Matrix representation of a linear transformation of a finite dimensional vector space. Inverse of a linear transformation on a finite dimensional vector space.

Unit V : Types of Matrices like Symmetric, Skew Symmetric, Hermitian, Skew Hermitian, orthogonal and Unitary matrices, Rank of Matrix, Cayley-Hamilton theorem , Eigen Values and Eigen Vectors.

Textbook .

1. H. H. Gibson, H., Linear Algebra, Hindustan Book Agency.
2. Hoffman, K. and Kunze, R. , Linear Algebra, Prentice-Hall Inc.
3. Bhatnamurthy, V., Mainra, V.P. and Arora, J.L., An Introduction to Linear Algebra, East west Press Pvt. Ltd. New Delhi.
4. Gopalakrishnan, N.S., University Algebra, New Age International.
5. Halmos ,P. R., Finite Dimensional Vector Spaces
6. Singh,S. and Zameeruddin , Q., Modern Algebra, Vikas Publishing House Pvt. Ltd
7. Dasgupta,S. A Text book of Matrix Algebra , New Age International

Note:

1.The question paper will contain two questions from each unit ( total ten questions) and candidates will be required to answer one question from each unit (total question to be attempted, will be five i.e there will be internal choice within each unit )

2. There should be minimum 75 lectures for the completion of syllabus where each lecture will be of one hour duration.

**G.C.W. Parade(Autonomous College)**  
**Syllabus**  
**B.A/B.Sc/B.C.A**  
**Semester-VI**  
**Statistics and Numerical Analysis**

Semester Examination : 80 Marks  
 Sessional Assessment: 20 Marks  
 Time: 3 hours

**Unit-1: Probability Distribution:**

Definition of a Random Variable, Distribution of a Random Variable, Continuous Distribution, Distribution Function(*d.f.*) and its properties. Two Types of Distributions : Discrete, Continuous. The idea of Probability Function (*p.f.*) and Probability Density Function (*p.d.f.*), Construction of a probability Distribution. Bernoulli Distribution. Conditions to be satisfied by a certain function in order that it may be a *p.f.* or a *p.d.f.* of a certain distribution.

**Expectations and Moments:**

Expectation of a random variable and its interpretation. Expectation  $(X-a)^k$  and  $E(X-E(x))^k$  ( $k=1,2,3$ ) where  $a$  is any arbitrary point and their interpretation. Relation between the moments about the mean in terms of moments about any points and vice versa. Moment generating function (*m.g.f.*). Properties of *m.g.f.* Expectation of the sum and product of points when  $n$  dice are thrown. Expectation of the sum of  $n$  bernoullian variates each with probability of success being  $p$ .

**Unit-2: Binomial Distribution:**

Binomial Distribution, its mean, variance and moment generating function(*m.g.f.*), Mode of the binomial distribution, measure of skewness and kurtosis. If  $X$  is  $b(n, p)$ , find the distribution of  $Z = \frac{X - np}{\sqrt{npq}}$ . Poisson distribution, its definition, Mean Variance and *m.g.f.* Poisson distribution as a limiting case of Binomial Distribution. Measure of Skewness and Kurtosis. If  $X$  is poisson variate with parameter  $\lambda$  say, then find the distribution of  $\frac{X - \lambda}{\sqrt{\lambda}}$ , Simple problems.

**Unit-3: Normal Distribution:**

Definition, mean, Variance and *m.g.f.* Properties of normal Curve. If  $X$  is  $N(\mu, \sigma)$ . Then  $Z = \frac{X - \mu}{\sigma}$  is  $N(0, 1)$  Normal distribution as a limiting case of binomial and poisson distribution. Simple problems. Distribution of mean and 95% confidence interval.

**Unit-4: Finite differences**

O,  $\Delta$ ,  $\Delta^2$  and  $\Delta^3$ . Interpolation. Linear and Quadratic interpolation. Newton's forward and backward difference interpolation formulas, Newton's divided difference interpolation formula, Lagrange's interpolation formula.

#### Unit V:

Central Difference Notation. Gauss's interpolation formulas, Stirling, Bessel and Everett formulas. Inverse Interpolation. Use of Lagrange's formula. Method of successive approximation iterations.

#### Text Books:

1. Hoed, A. M., Graybill, F. A. And Boes, D.C., Introduction to the Theory of Statistics, McGraw-Hill.
2. Hoel, P.G., Introduction to Mathematical Statistics, John Wiley and Sons.
3. Kapur J.N. Saxena, H.C. , Mathematical Statistics, S Chand and Co.
4. Gupta, S.C. , Fundamental of Statistics, S.Chand and Co.
5. Bajaj, C.P. and Gupta, P.N. ,Elements of Statistics,R.Chand and co.
6. Ostro, S.S., Introductory Methods of Numerical Analysis, Prentice-Hall of India.
7. H. Johnston, A., Afirst Course in Numerical Analysis, Dover Publications Inc.
8. Saxena, H.C., Calculus of Finite Differences, S.Chand and Co.
9. Sharma, H.S., Sharma,G.C., and Choudhary, S.S. , A textbook of Numerical Analysis, Ratan Prakasham Mandir, Agra.

#### Notes:

1. The question paper will contain two questions from each unit (total ten questions) and the candidates will be required to answer one question from each unit(total question to be attempted, will be five i.e. there will be internal choice within each unit)
2. There should be minimum 75 lectures for the completion of the syllabus where each lecture will be of one hour duration.

# G.C.W. Parade (Autonomous College)

## Syllabus

### B.Com. First Semester

### Business Mathematics I

Max Marks = 100

Internal Assessment = 20 Marks

External Exam = 80 Marks

Time: 3 hours

#### Unit – I: Logic

Logic Statement and notation, connectives, negation, conjunction, disjunction, statement formulas and truth table. Conditional and Biconditional Tautologies, Contradiction, WFF, Equivalent statements, Demorgan's Laws, Commutative Laws associative laws, Distributive Laws, Propositional functions, quantifies, truth set. Exercise Based on these concepts.

#### Unit – II: Set Theory

Concept of a set, operation of sets, Algebra of sets, Cartesian product of two sets and its application to business mathematics

#### Unit – III: Progressions

Arithmetic progression, Finding the nth term, sum of n terms, representation of A.P Geometric progression, Finding the nth term, sum of n terms and sum of infinity representation of an G.P, Special cases  $\sum n$ ,  $\sum n^2$ ,  $\sum n^3$

#### Unit – IV: Matrix and Determinant

Concept of matrix, algebra of matrices, inverse of matrices, determinant of a square matrix, expansion rule, properties of determinant, solution of a system of linear equation upto 3 variables Using 1. Cramer's Rule 2. The method of matrix inverse in Business Mathematics

#### Text Books:

1. Discrete & combinatoria Mathematics, 5/e by Ralph P. Grimaldi & B.V. Ramana
2. Pal and Pal: Engineering Mathematics Vol. 1 & Vol. 2.
3. Dr. A K Arte & R.V. Prabhakar: A Textbook of Business Mathematics
4. Saha: Business Mathematics
5. Kavita Gupta: Business Mathematics

#### Note For Business Mathematics Papers I & II

Equal weightage shall be given to all the units of the syllabus. The external paper shall be of two sections viz, A & B

Section – A: This section will contain four short answer questions selecting one from each unit. Each question carries 5 marks. A candidate is required to attempt all the four questions. Total weightage to this section shall be 20 marks

Section – B: This section will contain eight long answer questions of 15 marks each. Two questions with internal choice will be set from each unit. A candidate has to attempt any four questions selecting one from each unit. Total weightage to this section shall be 60 marks

# G.C.W. Parade (Autonomous College)

## Syllabus

### B.Com. Second Semester

### Business Mathematics- I

Max Marks = 100

Internal Assessment = 20 Marks

External Exam = 80 Marks

Time: 3 hours

#### Unit – I: Differentiation

Concept of limit and continuity; Derivative of a function of one variable; Derivative of some simple function by first principle; Derivative of the product of two functions, derivative of the quotient of two functions; Derivate of algebraic, exponential and logarithmic, Derivative as a rate measure, maximum and minimum, application in business.

#### Unit – II: Integration

Integration as anti-derivative process; Methods of integration by substitution, parts and using partial fractions; Definite integral and its managerial applications; Examples problems and exercises based on these concepts.

#### Unit – III: Principle of counting

Concept of factorial, principle of counting; Permutations and combinations; Permutation as arrangement; Meaning of  ${}^n P_r$  and  ${}^n C_r$ . Simple applications in business including circular permutations.

#### Unit – IV: Probability

Concept of probability, addition and multiplication; Laws of probability; Conditional probability; Bayes' theorem (statement only) with simple problem used on business situation.

#### Text Books:

1. Differential Calculus by Shanti Naryan & Dr. P.K. Mittal, Publisher S. Chand
2. Discrete and Combinatorial Mathematics, 5/e by Ralph P. Grimaldi & B.V. Ramana
3. Dorai Raj: Business Mathematics
4. Sanchethi and Kapoor: Business Mathematics
5. Zamiruddin & Khanna: Business Mathematics