

**BHARATHI WOMEN'S COLLEGE
(AUTONOMOUS)**

CHENNAI – 600 108

DEPARTMENT OF MATHEMATICS



(SEMESTER WITH CHOICE BASED CREDIT SYSTEM)

UG SYLLABUS

B.Sc. MATHEMATICS

(2019 - 2020 onwards)

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI - 108
B.Sc. MATHEMATICS
(CBCS Syllabus for UG students admitted from the academic year 2019-20)

SEMESTER I

Course Component	Code	Title of the paper	Credit	Hrs /week	ESE	CIA	Total
Lang-1	19LAA	General Tamil - I	3	6	75	25	100
Eng-1	19GEA	General English- I	3	4	75	25	100
Core T-1	19CAA	Algebra & Trigonometry	5	5	75	25	100
T-2	19CAB	Differential calculus	4	4	75	25	100
Allied	19AAA	Numerical Methods - I	5	6	75	25	100
Allied	19AAP	Allied Mathematics - I (Phy, Chem, C.S)	5	6	75	25	100
SBE-1 (Eng. for comm-1)	19SZ1	English for Communication - I	2	2	50	50	100
EVS	19EVS	Environmental Sciences	2	3	75	25	100

SEMESTER II

Course Component	Code	Title of the paper	Credit	Hr /week	ESE	CIA	Total
Lang-2	19LAB	General Tamil - II	3	6	75	25	100
Eng-2	19GER	General English- II	3	4	75	25	100
Core T-3	19CAC	Integral Calculus	5	5	75	25	100
T-4	19CAD	Differential Equations & Laplace Transforms	4	4	75	25	100
Allied	19AAB	Numerical Methods - II	5	6	75	25	100
Allied	19AAQ	Allied Mathematics - II (Phy, Chem, C.S)	5	6	75	25	100
SBE-2 (Eng. for comm-II)	19SZ2	English for Communication - II	2	2	50	50	100
VBE	19VBE	Value Based Education	3	3	75	25	100

SEMESTER III

Course Component	Code	Title of the paper	Credit	Hr week	ESE	CIA	Total
Lang-3	19LAC	General Tamil - III	3	6	75	25	100
Eng-3	19GEC	General English- III	3	6	75	25	100
Core T-5	19CAF	Analytical Geometry	4	4	75	25	100
T-6	19CAF	Vector Calculus & Fourier Series	4	4	75	25	100
Allied	19AAC	Mathematical Statistics - I	5	6	75	25	100
Allied	19AAX	Statistical Methods and Their Applications - I (Comp.Sci)	5	6	75	25	100
SBE-3 Comp. Skills	19SZ3	Computing skills - Basic	2	2	75	25	100
NME - I	19NAI	Descriptive Statistics	2	2	75	25	100

SEMESTER IV

Course Component	Code	Title of the paper	Credit	Hr /week	ESE	CIA	Total
Lang-4	19LAD	General Tamil - IV	3	6	75	25	100
Eng-4	19GED	General English- IV	3	6	75	25	100
Core T-7	19CAG	Mechanics - I	4	4	75	25	100
T-8	19CAH	Programming in C Theory	4	4	75	25	100
Allied	19AAD	Mathematical Statistics - II	5	6	75	25	100
Allied	19AAY	Statistical Methods and Their Applications - II (Comp.Sci)	5	6	75	25	100
SBE-4 Per. Devlp.	19SZ4	Personality Development	2	2	75	25	100
NME-2	19NA2	Functional Statistics	2	2	75	25	100
ExtAct	-	Extension Activity	3	-	-	-	-

SEMESTER V

Course component	Code	Title of the paper	Credit	Hr /week	ESE	CIA	Total
Core T-9	19CAJ	Abstract Algebra - I	5	6	75	25	100
T-10	19CAK	Real Analysis - I	5	6	75	25	100
T-11	19CAL	Mechanics- II	5	6	75	25	100
Core Practical -1	19CAI	Programming in C - Practical	5	6	60	40	100
Core Elect-1 (Any one)	19EAA	Operations Research - I	5	6	75	25	100
	19EAB	Numerical Analysis	5	6	75	25	100
	19EAC	Graph Theory	5	6	75	25	100

SEMESTER VI

Course Component	Code	Title of the paper	Credit	Hr /week	ESE	CIA	Total
Core T-12	19CAM	Abstract Algebra - II	5	6	75	25	100
T-13	19CAN	Real Analysis - II	5	6	75	25	100
T-14	19CAP	Complex Analysis	5	6	75	25	100
Core Elect-2 (Any one)	19EAD	Operations Research - II	5	6	75	25	100
	19EAE	Fuzzy Mathematics	5	6	75	25	100
	19EAF	Elementary Number Theory	5	6	75	25	100
Core Elect-3 (Any one)	19EAG	Discrete Mathematics	5	6	75	25	100
	19EAH	Astronomy	5	6	75	25	100
	19EAI	Combinatorial Mathematics	5	6	75	25	100

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI-600 108

DEPARTMENT OF MATHEMATICS

INTERNAL ASSESSMENT PATTERN

THEORY PAPERS

INTERNAL MARKS – 25

TEST	: 10
ASSIGNMENT	: 10
MODEL EXAM	: 25
ATTENDANCE	: 5
TOTAL	: 50
REDUCED TO	: 25

PRACTICAL

INTERNAL TOTAL MARKS - 40

RESULT AND ACCURACY	: 10
RECORD	: 10
TEST	: 5
MODEL EXAM	: 10
ATTENDANCE	: 5

EXTERNAL TOTAL MARKS - 60

SUBMISSION OF RECORD	: 10
ANSWER 2 OUT OF 4 QUESTION 2×25	: 50

ATTENDANCE BREAK UP

Below 50%	REDO the semester
50% to 64%	Not Eligible for the current semester – 2 marks
65% to 74%	3 Marks (Con-donation)
75% to 89%	4 Marks
90% to 100%	5 Marks

Website for Online Reference : <http://nptel.ac.in>

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI-600 108

DEPARTMENT OF MATHEMATICS

PATTERN OF QUESTION PAPER

1. CORE / ALLIED and ELECTIVE SUBJECTS

(QUESTION TO BE SET NOT OMITTING ANY UNIT IN ALL THE SECTIONS)

SECTION A **10 * 2 = 20 MARKS**
10 QUESTIONS – NO CHOICE

SECTION B **5 * 5 = 25 MARKS**
ANSWER 5 OUT OF 7 QUESTIONS

SECTION C **3 * 10 = 30 MARKS**
ANSWER 3 OUT OF 5 QUESTIONS

TOTAL **75 MARKS**

2. NME / SBE / VBE

(QUESTION TO BE SET NOT OMITTING ANY UNIT IN ALL THE SECTIONS)

SECTION A **5 * 5 = 25 MARKS**
ANSWER 5 OUT OF 7

SECTION B **5 * 10 = 50 MARKS**
ANSWER 5 OUT OF 8

TOTAL **75 MARKS**

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS
CORE PAPER I – ALGEBRA AND TRIGONOMETRY
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 5

CREDITS : 5

SEMESTER : I

SUBJECT CODE: 19CAA

OBJECTIVE

To develop problem solving and computing skills, and to impart basic knowledge in trigonometry and number theory.

UNIT I

Summation of series: Binomial, Exponential and Logarithmic series (without proofs) – Simple problems.

Algebra Volume I: Chapter 3- sections 10

Chapter 4- sections 3, 5, 6, 7 and 9.

UNIT II

Symmetric function of the roots in terms of coefficients - Transformations of equations – Roots with signs changed, Roots multiplied by a given number, Reciprocal roots - Reciprocal equations - Increasing and diminishing the roots,.

Algebra Volume I: Chapter 6- sections 12 and 15-17.

UNIT III

Symmetric - Skew symmetric - Hermitian - Skew Hermitian - Orthogonal and Unitary Matrices - Eigen Values and Eigen Vectors – Similar Matrices – Cayley Hamilton theorem - Diagonalization of a Matrix.

Algebra Volume II: Chapter 2- sections 6, 9, and 16.

UNIT IV

Prime Number - Composite Number - Decomposition of a Composite Number as a Product of Primes uniquely (without proof) - Divisors of a Positive Integer - The Theory of Congruence - Basic Properties of Congruence - Euler Function (without Proof) - Highest Power of a Prime Number p contained in $n!$ - Fermat's and Wilson's Theorems (without proof).

Algebra Volume I: Chapter 5- sections 1- 13, 16(omit 16.1), 17.

UNIT V

Expansions of $\cos n\theta$, $\sin n\theta$ - Expansion of $\tan n\theta$ in terms of $\tan \theta$ -. Powers of sines and cosines of θ in terms of functions of multiples of θ - Expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ – Hyperbolic Functions - Relation between Hyperbolic Functions and trigonometric functions- Inverse Hyperbolic Functions.

Trigonometry: Chapter 3- sections 1, 2 and 4, Chapter 4- sections 1 and 2.

BOOKS FOR STUDY

1. T.K. Manicavachagom Pillai, T. Natarajan and K.S. Ganapathy, *Algebra Volume I and II*, S. Viswanathan Publishers Pvt. Ltd., 2008.
2. S. Narayanan and T.K. Manicavachagom Pillai, *Trigonometry*, S. Viswanathan Publishers Pvt.Ltd., 2006.

BOOKS FOR REFERENCE

1. Arumugam S, Thangapandi Issac, *Classical Algebra*, New Gamma Publishing House, Palayamkottai.
2. Burnside W.S. and A.W. Panton, *Theory of Equations*, Dublin University Press, 1954.
3. Kumaravelu S and SusheelaKumaravelu, *Elements of Number Theory*, Nagarcoil, 2002.
4. Arumugam S, Thangapandi Issac A, *Trigonometry*, New Gamma Publishing House, 2017.

OUTCOME OF LEARNING

Students will be able to

- Find the sum of the series: Binomial, Exponential and Logarithmic.
- Compute the Eigen values and Eigen vectors and inverse of a matrix using Cayley – Hamilton Theorem.
- Understand the results on prime number and also to find the Sum, product of all the divisors of N.
- Expand $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ in terms of θ and define hyperbolic and inverse hyperbolic functions.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108

B.Sc. - MATHEMATICS

CORE PAPER II – DIFFERENTIAL CALCULUS

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 4

CREDITS : 4

SEMESTER : I

SUBJECT CODE: 19CAB

OBJECTIVE

To impart an exhaustive knowledge in partial differentiation and to explain the use of differential calculus to solve physics, geometry and optimization problems.

UNIT I

Partial differentiation – Function of function rule - Total Differential co-efficient –Implicit function – Homogeneous function – Partial derivatives of a function of two functions – Jacobians – Simple problems.

Chapter 8: Section 1.1 – 1.7 & Volume II Chapter 6: Section 1.1 (Book-1)

Chapter 2: Section 10 (Book-2)

UNIT II

Maxima and minima of functions of 2 and 3 independent variables – Necessary and sufficient conditions (without proof) – Lagrange's method (without Proof) – Simple problems on these concepts.

Chapter 8: Section 4, 5 (Pg. No. 222 – 240) (Book-1)

UNIT III

Curvature – Radius of curvature in Cartesian and Polar co-ordinates - p-r equations- Centre of Curvature.

Chapter 10: Section 2.1 – 2.4, 2.6, 2.7. (Book-1)

UNIT IV

Evolutes - Envelopes – Method of finding envelopes (one parameter and two parameter family).

Chapter 10: Section 2.5, 1.1 – 1.4. (Book-1)

UNIT V

Asymptotes - Asymptotes of plane algebraic curves - Asymptotes parallel to the axis – Special cases- Another method of finding asymptotes- Asymptotes by inspection.

Chapter 11: Section 1 – 6. (Book-1)

BOOKS FOR STUDY

1. S. Narayanan, and T.K. Manicavachagom Pillai, *Calculus Volume – I*, S. Viswanathan Publishers.
2. P. Kandhasamy and K. Thilagavathy, *Mathematics Volume – I*, S.Chand & Company, 2004.

BOOKS FOR REFERENCE

1. P. R. Vittal, *Differential Calculus*, Margam Publishers.
2. Shanthi Narayanan, P.K. Mittal, *Differential Calculus*, S.Chand Publishing.

OUTCOME OF LEARNING

Students understood the concepts of implicit function, homogeneous function, partial derivatives of a function of two functions, Jacobians, Lagrange's method, Maxima and minima, Curvature, Evolutes, Envelopes and Asymptotes.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS), CHENNAI-600 108
B.Sc. – MATHEMATICS

ALLIED PAPER I – NUMERICAL METHODS – I
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6
CREDITS : 5

SEMESTER : I
SUBJECT CODE: 19AAA

OBJECTIVE

To learn the iterative methods of finding the roots of algebraic and transcendental equations and also to find the eigen values and eigen vectors of matrices. To acquire knowledge in solving the system of linear algebraic equations by direct and indirect methods. To introduce the operators in finite differences and to understand the numerical techniques of interpolation in equal and unequal intervals.

UNIT I

Solution of numerical algebraic and transcendental equations – Bisection method, Iteration method, Regula falsi method, Newton-Raphson method.

Chapter 3: Sections 3.1-3.4

UNIT II

Solution of simultaneous linear algebraic equations – Gauss-Elimination method, Gauss-Jordan method, Gauss-Jacobi method, Gauss-Seidal method – Eigen values of a matrix by power method.

Chapter 4: Sections 4.1-4.2, 4.8-4.9 and 13.1

UNIT III

Finite Differences - Δ , ∇ , E operators and relation between them, Differences of a polynomial, Factorial polynomial, differences of zero, summation of series.

Chapter 5: Sections 5.1-5.5 and 5.7

UNIT IV

Interpolation with equal intervals – Newton's Forward and Backward interpolation formula, Central differences formula, Gauss forward and backward formula, Stirling's formula and Bessel's formula.

Chapter 6: Sections 6.1-6.7, 7.1-7.6.

UNIT V

Interpolation with unequal intervals - Divided differences and Newton's divided difference formula for interpolation and Lagrange's formula for interpolation - Inverse interpolation – Lagrange's method.

Chapter 8: Sections 8.1-8.8

BOOKS FOR STUDY

P. Kandasamy, K. Thilagavathy and K. Gunavathy, *Numerical Methods*, 2003, S.Chand & Co.

BOOKS FOR REFERENCE

1. Gupta Malik, *Calculus Of Finite Differences And Numerical Analysis*, Krishna Prakasan Mandir, Meerut
2. M.K. Venkataraman, *Numerical Methods in Science and Engineering*, National publishing house, Chennai.
3. B.D.Gupta, *Numerical Analysis*, KonarkE publishing.
4. Saxena, *Calculus of Finite Differences and Numerical Analysis*, S. Chand & Co.

OUTCOME OF LEARNING

Students will be able to

- Obtain numerical solutions of algebraic and transcendental equations.
- Find numerical solutions of system of linear equations and check the accuracy of the solutions.
- Acquire knowledge on various operators and factorial polynomial.
- Determine the eigen values of a matrix by power method.
- Understand the various interpolating methods for equal and unequal intervals.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

ALLIED I PAPER I –ALLIED MATHEMATICS - I

(For Physics, Chemistry & Computer Science courses)

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : I

SUBJECT CODE: 19AAP

OBJECTIVE

To introduce the basic concepts of Algebra, Trigonometry and Calculus. To develop mathematical skills for solving the problems in other branches of science.

UNIT I

Algebra and Trigonometry: Solution of third degree equations whose roots are in A.P, G.P and H.P - Reciprocal equations - Expansion of $\sin n\theta$, $\cos n\theta$ in terms of $\sin \theta$ and $\cos \theta$ - Expansion for $\cos^n \theta$, $\sin^n \theta$ in terms of multiple angles of θ .

Algebra- Chapter 1:Page No. 39-47, Chapter-2 Page No. 56-63

Trigonometry- Chapter 1:Page No. 196-210

UNIT II

Differential Calculus: Jacobian - Curvature and radius of curvature in Cartesian Coordinates and polar coordinates.

Differential Calculus - Chapter 2: Page No. 246-251; Chapter-4 Page No. 261-273

UNIT III

Integral Calculus: Reduction formula($\int \sin^n x dx$, $\int \cos^n x dx$ and $\int \sin^m x \cos^n x dx$), Properties of definite integrals (without proof). Multiple Integrals: Evaluation of double & triple integrals (Cartesian co-ordinates only) - Simple problems.

Integral Calculus- Chapter2: Page No.: 53-60: Chapter 3: Page No. 61-63

Multiple Integrals -Chapter 4: Page No. 83-87; 91-95

UNIT IV

Laplace Transforms – Definition – Sufficient condition – Standard functions - Simple problems (excluding periodic function).

Laplace Transforms- Page No.234-248

UNIT V

Inverse Laplace Transforms - Applying Laplace Transforms to find solution of second order linear differential equations (constant coefficients) – Simple problems.

Laplace Transforms- Page No.248-284

BOOK FOR STUDY

P.Kandasamy & K.Thilagavathy, *Allied Mathematics Volume I & II*, 2003,2004, S.Chand & Co.

BOOKS FOR REFERENCE

1. Narayanan & Manickavachagom Pillai, *Allied Mathematics*, S. Viswanathan Publishers
2. P.R. Vittal, *Allied Mathematics*, Margham Publications.
3. P. Durairandian & S. Uayabaskaran, *Allied Mathematics Volume I & II*.
4. P. Balasubrahmanyam and K.G. Subramanian, *Ancillary Mathematics Volume I & II*, Tata McGraw Hill Publishing Company Ltd., New Delhi.

OUTCOME OF LEARNING

Students will be able to

- Solve the equations upto 3rd degree and also to solve the reciprocal equations.
- Expand $\cosh \theta$, $\sinh \theta$ and $\tanh \theta$ in terms of θ and define hyperbolic and inverse hyperbolic functions.
- Determine Jacobians, Curvature and radius of curvature.
- Solve basic integral calculus problems and multiple integrals.
- Apply the basic properties of Laplace transform and to solve the linear differential equations by using Laplace transform.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER III – INTEGRAL CALCULUS
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 5

CREDITS : 5

SEMESTER : II

SUBJECT CODE: 19CAC

OBJECTIVE

To introduce the fundamental principles, concepts and knowledge in the area of integral calculus. To prepare the students for applying these concepts to other courses.

UNIT I

Integrals of the type $\int \frac{dx}{a+b\cos x}$, $\int \frac{dx}{a+b\sin x}$ and $\int \frac{dx}{a^2\cos^2 x+b^2\sin^2 x}$ – Properties of definite integrals – Integration by parts- Simple problems.

Chapter 1: Sections 9 - 12

UNIT II

Reduction formula - Integrals of the type $\int e^{ax} \cos bx \, dx$ and $\int e^{ax} \sin bx \, dx$ - Bernoulli's formula -Simple problems.

Chapter 1: Sections 13 - 15.1

UNIT III

Double integrals (both Cartesian and Polar co-ordinates) – Change of order of integration.

Chapter 5: Sections 1 – 3

UNIT IV

Triple integrals – Applications of multiple integrals.

Chapter 5: Sections 4 – 5

UNIT V

Beta and Gamma functions – Properties and simple problems, Application of Beta and Gamma functions in evaluation of double integrals.

Chapter 7: Sections 1 – 6

BOOK FOR STUDY

S. Narayanan and T.K Manicavachagom Pillai, *Calculus Volume II*, S. Viswanathan (Printers & Publishers) Pvt. Ltd.,

BOOKS FOR REFERENCE

1. Kandasamy P and Thilagavathi K., *Mathematics for B.Sc Volume II*, S.Chand& Company Ltd., NewDelhi-55.
2. Arumugam S and Thangapandi Issac A, *Calculus*, New Gamma Publishing House.

OUTCOME OF LEARNING

Students will able to

- Solve basic integral calculus problems, explain properties of definite integrals, prove reduction formulae and solve some problems by using these formulae.
- Evaluate double and triple integrals and also evaluating by changing the order of integration.
- Apply basic properties of beta and gamma functions for the evaluation of integrals.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS
CORE PAPER IV – DIFFERENTIAL EQUATIONS & LAPLACE
TRANSFORMS

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 4
CREDITS : 4

SEMESTER : II
SUBJECT CODE: 19CAD

OBJECTIVE

To apply the appropriate analytic techniques for finding the solutions of ordinary differential equations. To equip students with the concepts of forming and solving partial differential equations. To inculcate the importance of one of the integral transforms- Laplace transforms which has many applications in physics and engineering.

UNIT I

First order but of higher degree equations solvable for p , solvable for x , solvable for y – Clairaut's form – Simple problems.

Chapter 1: Section 5.1-5.5, 6.1

UNIT II

Second order equations with constant co-efficients with particular integrals $e^{ax}\sin nx$, $e^{ax}\cos nx$, $e^{ax}x^n$ - Second order differential equations with variable coefficients.

Chapter 2: Section 4, 8

UNIT III

Formation of P.D.E by eliminating arbitrary constants and arbitrary functions – Complete integral -Singular integral – General integral – Standard types $f(p,q)=0$, $f(x,p,q)=0$, $f(y,p,q)=0$, $f(z, p, q) = 0$, $f_1(x,p) = f_2(y,q)$ - Clairaut's form and Lagrange's equation $Pp+Qq=R$ - Simple problems.

Chapter 4: Sections 1-6.

UNIT IV

Laplace Transforms – Definition – sufficient condition – standard functions - Initial and final value theorem - simple problems (excluding periodic function).

Chapter- 5: Sections 1-5.

UNIT V

Inverse Laplace Transforms (Usual type) - Convolution theorem (without proof) - Applying Laplace Transforms to find solution of first and second order linear differential equations (constant coefficients) – simple problems.

Chapter- 5: Sections 6 – 10.

BOOK FOR STUDY

S. Narayanan and T.K. Manickavachagam Pillai, *Calculus Volume III*, S.Viswanathan Pvt. Ltd.

BOOK FOR REFERENCE

S.Sankarappan and S.Kalavathy,*Differential Equations & Laplace Transforms*, Vijay Nicole Imprints Pvt. Ltd.

OUTCOME OF LEARNING

Students will be able to

- Find solution of higher-order linear differential equations with constant and variable coefficients.
- Formulate partial differential equations by eliminating arbitrary constants and functions.
- Apply the basic properties of Laplace transform and inverse Laplace transform to solve the linear differential equations.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

ALLIED I PAPER II – NUMERICAL METHODS – II
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : II

SUBJECT CODE: 19AAB

OBJECTIVE

To understand the numerical techniques of differentiation and integration of interpolating polynomials. To learn the methods of solving second order difference equations. To find the numerical solution of first order ordinary differential equations with initial conditions and the partial differential equations with initial and boundary conditions by using different methods.

UNIT I

Numerical Differentiation and Integration - Derivatives using Newton's forward and backward difference formulae, General quadrature formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule.

Chapter 9: Sections 9.1-9.3, 9.7-9.9, 9.13-9.14

UNIT II

Difference Equations - Linear homogenous and non-homogeneous difference equation with constant coefficients, particular integrals for $a^n x^m$, x^m , $\sin kx$, $\cos kx$.

Chapter 10: Sections 10.1-10.7

UNIT III

Numerical solution of Ordinary Differential Equations - Numerical Solution of ordinary differential equations (first order only) by Taylor's series method, Euler's method, Modified Euler's method.

Chapter 11: Sections 11.5, 11.9, 11.11

UNIT IV

Numerical solution of Ordinary Differential Equations - Runge-kutta second order and fourth order methods only, Multi step method – Milne's and Adam's predictor and corrector methods.

Chapter 11: Sections 11.13, 11.17 and 11.18

UNIT V

Numerical solutions of Partial Differential Equations - Difference Quotient, Elliptic equations, Poisson equations, Parabolic equations.

Chapter 12: Sections 12.1-12.9

BOOK FOR STUDY

P. Kandasamy, K. Thilagavathy & K. Gunavathy, *Numerical Methods*, 2003, S.Chand & Company Ltd.

BOOKS FOR REFERENCE

1. Gupta Malik, *Calculus Of Finite Differences And Numerical Analysis*, Krishna Prakasan Mandir, Meerut
2. M.K. Venkataraman, *Numerical Methods in Science and Engineering*, National publishing house, Chennai.
3. B.D.Gupta, *Numerical Analysis*, Konark E publishing.
4. Saxena, *Calculus of Finite Differences and Numerical Analysis*, S. Chand & Co.

OUTCOME OF LEARNING

Students will be able to

- Solve initial and boundary value problems in ordinary and partial differential equations and difference equations using numerical methods.
- Apply various numerical methods in real life problems.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

ALLIED I PAPER II – ALLIED MATHEMATICS - II

(For Physics, Chemistry & Computer Science courses)

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : II

SUBJECT CODE: 19AAQ

OBJECTIVE

To introduce the basic concepts of Finite differences, Vector calculus and Fourier series in order to develop mathematical skills and solve the problems in other branches of science.

UNIT I

Finite Differences: Arguments, entry differences, differential tables, Operators Δ , E , δ , ∇ , - Newton's forward, backward formula, Lagrange's interpolation formula.

Finite Differences:Page No. 147 – 195.

UNIT II

Ordinary differential equation: Second order differential equation with constant coefficients - Particular integrals for e^{ax} , x^m , $\sin mx$, $\cos mx$.

Differential Equations: Chapter 3:Page No. 42 – 58.

UNIT III

Vector Calculus: Introduction – Gradient – Divergence – Curl - Solenoidal and Irrotational Vectors - Directional derivative - Unit Normal to a surface.

Vector Analysis: Chapter 2: Page No. 306 – 320.

UNIT IV

Gauss, Stokes and Green's theorems (without proof) - Simple problems on square, rectangle, cube and cuboid.

Vector Analysis: Chapter 3: Page No. 321 – 344.

UNIT V

Fourier Series: Dirichlet's conditions- Fourier series of functions with period 2π – Fourier series of odd and even functions.

Fourier Series:Page No. 140 – 159.

BOOK FOR STUDY

P.Kandasamy & K.Thilagavathy, *Allied Mathematics Volume I & II*, 2003, 2004, S.Chand & Co.

BOOKS FOR REFERENCE

1. Narayanan & Manickavachagom Pillai, *Allied Mathematics*, S. Viswanathan Publishers
2. P.R. Vittal, *Allied Mathematics*, Margham Publications.
3. P. Duraipandian & S. Udayabaskaran, *Allied Mathematics Volume I & II*.
4. P. Balasubrahmanyam and K.G. Subramanian, *Ancillary Mathematics Volume I & II*, Tata McGraw Hill Publishing Company Ltd., New Delhi.

OUTCOME OF LEARNING

Students will be able to

- Apply various operators and also to solve various interpolating methods for equal and unequal intervals.
- Find solution of second order linear differential equations with constant coefficients.
- Solve problems using vector differentiation and integration.
- Find the Fourier series for the periodic functions.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER V – ANALYTICAL GEOMETRY
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 4
CREDITS : 4

SEMESTER : III
SUBJECT CODE: 19CAE

OBJECTIVE

Students are exposed to fundamental aspects of Two Dimensional Analytical Geometry and it develops logical and systematic computational skills. To give basic ideas of the three dimensional co-ordinate system and to have a thorough knowledge of Sphere, Cone and Cylinder.

UNIT I

Polar, Pole, Co-normal, concyclic-Parabola and Ellipse.

Chapter VI: sec. 6, 6.1,11,12

Chapter VII:sec. 7,7.1, 12, 12.1, 13

UNIT II

Conjugate diameters for Ellipse and Hyperbola. Hyperbola- Asymptotes, Angle between the asymptotes, Properties of Asymptotes.

Chapter VII: sec. 16, 16.1-16.3

Chapter VIII: sec. 4 – 9 (excluding 7)

UNIT III

The Sphere: General equation – Equation of a sphere with given centre and radius – Length of the tangent from the given point to the sphere – Plane section of a sphere – Intersection of two spheres – Tangent plane to a sphere.

Chapter IV - Section: 1 - 8

UNIT IV

Cone: Necessary condition for a general equation of second degree to represent cone – Right circular cone – Tangent plane – Normal – Angle between the lines in which the plane cuts the cone.

Chapter V- Section: 1 - 7

UNIT V

Cylinder: Equation of the cylinder whose generators are parallel to the line with given guiding curve – Right circular cylinder – Enveloping cylinder.

Chapter V - Section: 8

BOOKS FOR STUDY

1. T.K. Manicavachagom Pillay and T.Natarajans, *Analytical Geometry Part I 2D*, S. Viswanathan Publishers Pvt. Ltd., 2008.

2. T.K. Manicavachagom Pillay and T.Natarajans, *Analytical Geometry Part II 3D*, S. Viswanathan Publishers Pvt. Ltd., 2012.

BOOKS FOR REFERENCE

1. Shanti Narayan and Dr. P.K. Mittal, *Analytical Solid Geometry*, S Chand and Company Ltd., New Delhi.
2. S. Narayanan and T.K.Manicavachagom Pillay, *Calculus Volume III*, S.Viswanathan Pvt. Ltd.
3. P. Duraipandian and Lakshmi Duraipandian, *Analytical Geometry 3D*, Emerald Publishers and Distributors.

OUTCOME OF LEARNING

Students will be able to

- Determine the locus of the pole of tangents, normals and chord under any geometric conditions.
- Formulate various forms of equation of a Sphere, Cone and Cylinder.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER VI – VECTOR CALCULUS AND FOURIER SERIES

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 4

CREDITS : 4

SEMESTER : III

SUBJECT CODE: 19CAF

OBJECTIVE

To introduce and develop the methods of vector analysis which are fundamental tool in many theories of Applied Mathematics. To understand the various integral theorems relating line, surface and volume integrals. To understand Fourier series representation of periodic functions.

UNIT I

Vector differentiation – Gradient – Divergence – Curl-Directional derivative – Unit normal to a surface.

Vector Analysis: Chapter 1, 2, 3

UNIT II

Vector Integration – Line, surface and volume integrals.

Vector Analysis: Chapter 5

UNIT III

Theorems of Gauss, Stokes and Green's (without proof) - Simple problems.

Vector Analysis: Chapter 6

UNIT IV

Dirichlet's condition - Fourier series expansions of periodic function with period 2π and $2l$ - Odd and Even functions.

Fourier Series:Page No. 96 – 134.

UNIT V

Half range series (both 0 to π and 0 to l) – Complex form of Fourier series – Parseval's Identity – Harmonic Analysis.

Fourier Series:Page No. 135 – 189.

BOOKS FOR STUDY

1. P. Duraipandian and Kayalal Pachaiyappa, *Vector Analysis*, Muhil Publishers.
2. P.Kandaswamy, K.Thilagavathy& K.Gunavathy, *Mathematics Volume IV*, S Chand & Co., 2005.

BOOKS FOR REFERENCE

1. P.R.Vittal, *Vector Calculus, Fourier series and Fourier Transform*, Margham Publications, Chennai.
2. M.K.Venkataraman, *Engineering Mathematics-Part B*, National Publishing Company, Chennai.
3. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publishers, New Delhi.

OUTCOME OF LEARNING

Students will be able to

- Solve problems using vector differentiation and integration.
- Understand that any periodic function can be expressed as Fourier series.
- Expand an odd or even function as a half range cosine or sine Fourier series.
- Obtain the complex exponential Fourier series of a function and also known to find the solution numerically by using Harmonic analysis.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

ALLIED II PAPER I – MATHEMATICAL STATISTICS – I
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : III

SUBJECT CODE: 19AAC

OBJECTIVE

To build the basis for promoting theoretical and application aspects of statistics. To emphasize the relevance of statistical tools and techniques of analysis in the study of inter disciplinary sciences.

UNIT I

Measures of Central Tendency-Measures of Dispersion, Moments, Skewness and Kurtosis

Chapter-2 Sections 2.3-2.9;

Chapter 3 Sections 3.1- 3.9(3.9.1 & 3.9.2), 3.10, 3.11&3.12

UNIT II

Probability of an event – Definition (Classical and Empirical) – Axiomatic approach to probability – Addition and Multiplication Laws of probability – Independent events – Conditional probability– Baye's Theorem

Chapter – 4 Sections 4.1-4.8(omit sections 4.6.3 & 4.7.1)

UNIT III

Random variables – Distribution function - Discrete and continuous Random variable - Two dimensional random variable– Marginal and conditional distributions and independence of random variables.

Chapter – 5 Sections 5.1-5.5 (omit section 5.6)

UNIT IV

Mathematical Expectation- Addition & Multiplication theorem of Expectation- Co-variance- Conditional Expectation and conditional Variance -Moment generating function –Definition and properties – Characteristic function-Definition and properties-Uniqueness theorem of Characteristic function - Chebyshev's inequality- Simple Problems.

Chapter – 6 Sections 6.1-6.12 (omit section 6.10)

UNIT V

Correlation and Regression – Correlation- scatter Diagram- Karl Pearson Coefficient of Correlation– Rank Correlation, Regression

Chapter – 10 Sections 10.1-10.7 (omit sections10.5 & 10.7.6)

BOOK FOR STUDY

S.C. Gupta and V.K. Kapoor, *Elements of Mathematical Statistics*, Third Edition, Sultan Chand & Sons.

BOOKS FOR REFERENCE

1. Dr.P.R.Vittal, *Mathematical Statistics*, Marghaum Publications
2. S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons
3. Goon Gupta A.M and Das Gupta, *Fundamentals of Statistics*, 1994, The World Press Private Limited, Calcutta
4. J.N.Kapur and H.C.Saxena, *Mathematical Statistics*, 1999, S.Chand and Company Ltd., New Delhi.

OUTCOME OF LEARNING

Students will be able to

- Solve the real life problems using the concepts of probability and conditional probability.
- Understand the concepts of random variables, probability distribution and its function, expected value, variance, moments and its generating functions to establish the distribution of linear combinations of independent random variables.
- Recognize the importance and value of mathematical and statistical thinking, training, and approach to problem solving, on a diverse variety of disciplines.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

**ALLIED II PAPER I – STATISTICAL METHODS AND THEIR
APPLICATIONS-I**

(For Computer Science Students)
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6
CREDITS : 5

SEMESTER : III
SUBJECT CODE: 19AAX

OBJECTIVE

To apply Statistical methods for Mathematical problems and enhance the methodology to analyze data. To impart ideas of basic concepts of classification, tabulation, diagrammatic representation and measures of averages of data in statistics.

UNIT I

Nature and Scope of Statistical methods and their limitations – Frequency Curves – Ogives – Measures of Central tendencies.

Chapter – 1, 2 (2.1 – 2.9) .

UNIT II

Measures of dispersion – Moments, Skewness and Kurtosis.

Chapter – 3 : 3.1 – 3.12 (omit 3.7.1 – 3.7.3, 3.9.2 – 3.9.4)

UNIT III

Probability of an event – Addition & Multiplication theorems – Conditional probability – Baye's theorem – Random variables – Distribution function - Discrete and continuous Random variable - Binomial, Poisson, uniform, normal and exponential distributions (definitions only) – Fitting of Binomial and Poisson distributions.

Chapter – 4 , Chapter –5: 5.1 -5.4, Chapter –7: 7.2,7.3, Chapter – 8: 8.1,8.2, 8.6

UNIT IV

Mathematical Expectation – Moments of a random variable – Moment generation function – Chebychev's inequality – Simple problems.

Chapter –6: 6.1 -6.9, 6.12

UNIT V

Correlation Coefficient, Correlation coefficient for bi-variate distributions – Scatter diagram – Regression coefficients and regression lines – Rank correlation coefficient.

Chapter – 10: 10.1 – 10.7.4

BOOK FOR STUDY

S.C. Gupta and V.K. Kapoor, *Elements of Mathematical Statistics*, Third Edition, Sultan Chand & Sons.

BOOKS FOR REFERENCE

1. Dr.P.R.Vittal, *Mathematical Statistics*, Marghaum Publications
2. S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons
3. Goon Gupta A.M and Das Gupta, *Fundamentals of Statistics*, 1994, The World Press Private Limited, Calcutta
4. J.N.Kapur and H.C.Saxena, *Mathematical Statistics*, 1999, S.Chand and Company Ltd., New Delhi.

OUTCOME OF LEARNING

Students will be able to

- Analyze Statistical data, Compute Binomial, Poisson, uniform, normal and exponential distributions
- Find the Correlation & Regression coefficients.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

NON MAJOR ELECTIVE I – DESCRIPTIVE STATISTICS

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 2

CREDITS : 2

SEMESTER : III

SUBJECT CODE: 19NA1

OBJECTIVE

To impart ideas of basic concepts of classification, tabulation, diagrammatic representation and measures of averages of data in statistics.

UNIT I

Introduction of Statistics - Classification and Tabulation of data.

Chapter: 3

UNIT II

Diagrammatic representation of data – Bar, Pie diagrams, Pictogram, Graphical representations of data.

Chapter: 4

UNIT III

Measures of averages – Arithmetic mean, Geometric mean, Harmonic mean, weighted arithmetic mean – Problems.

Chapter: 5 (Pg.: 50 - 55)

UNIT IV

Median, Mode- Problems.

Chapter: 5 (Pg.: 55 - 74)

BOOK FOR STUDY

P.R. Vittal, *Business Statistics*, Margham Publications.

OUTCOME OF LEARNING

Students will be able to

- Analyze Statistical data and known to represent diagrammatically
- Find the different measures of averages.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER VII – MECHANICS – I
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 4

CREDITS : 4

SEMESTER : IV

SUBJECT CODE: 19CAG

OBJECTIVE

To develop the ability to visualize, formulate and solve problems in Statics. To develop the capacity to predict the effects of force while carrying out the creative design function.

UNIT I

Forces: Forces – Types of forces – Resultant of two forces on a particle-Resultant of three forces related to a triangle acting at a point - Resultant of several forces acting on a particle-Simple problems.

Chapter 2: Sections 2.1, 2.2

UNIT II

Equilibrium of a particle: Equilibrium of a particle under three forces – Equilibrium of a particle under several forces –simple problems. Moment of a force – General motion of a rigid body-Equivalent (or Equipolant) system of forces - Parallel forces – forces along the sides of a triangle - couples - Simple problems.

Chapter 3: Sections 3.1 and Chapter 4: Sections 4.1 to 4.6

UNIT III

Forces on a rigid body: Resultant of several coplanar forces – Equation of the line of action of the resultant – Equilibrium of a rigid body under three coplanar forces – Simple problems.

Chapter 4: Sections 4.7-4.9

UNIT IV

Centre of Mass: Centre of mass-finding mass center (not using integration)- Finding mass centre using integration- Mass centre of a non-homogeneous solid - Moment of mass - Simple problems.

Chapter 6: Section 6.1-6.2

UNIT V

Hanging String: Equilibrium of a uniform homogenous string – Sag, Suspension bridge – Simple Problems.

Chapter 9: Section 9.1, 9.2

BOOK FOR STUDY

P. Duraipandian and others, *Mechanics*, 2010 Edn., S. Chand Company Ltd.

BOOKS FOR REFERENCE

1. K. Viswanath Naik and M.S. Kasi, *Statics*, Emerald Publishers.
2. A.V. Dharmapadham, *Statics*, S. Viswanathan Publishers.
3. S. Narayanan and others, *Statics*, S. Chand Company Ltd.
4. M.K. Venkatraman, *A text book on Dynamics*, 2001, Agasthiar Publication, Trichy.

OUTCOME OF LEARNING

Students will able to

- Get the knowledge about Component of a Force, Coplanar forces, like and unlike parallel forces, Moment of a force and Couple with examples, Parallelogram of Forces, Triangle of Forces, Converse of the Triangle of Forces, Polygon of Forces which were help the students in their daily life.
- Find the resultant of coplanar couples, equilibrium of couples and the equation to the line of action of the resultant.
- Understand the knowledge about suspension Bridge through Hanging strings.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER VIII – PROGRAMMING IN 'C' THEORY
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 4

CREDITS : 4

SEMESTER : IV

SUBJECT CODE: 19CAH

OBJECTIVE

To improve logical thinking and better understanding of programming techniques. To develop programming skill in the computer language C.

UNIT I

Constants, Variables, Data Types And Operators: Introduction, character set, C tokens, keywords and identifiers, Constants, Variables, Data types, Declaration of variables, Assigning values to variables - Arithmetic, Relational, Increment and Decrement, Conditional operators.

Chapter- 2 Sections: 2.1-2.10; Chapter- 3 Sections: 3.1-3.7

UNIT II

Expressions, Input and Output Operators: Arithmetic expressions, evaluation of expressions, precedence of arithmetic operators -Reading a character, Writing a character, Formatted input and output.

Chapter - 3 Sections: 3.10-3.12; Chapter- 4 Sections 4.1-4.5

UNIT III

Decision Making (Branching and Looping): Introduction, Decision making with if statement, simple if statement, the if...else statement, nesting of if... else statements, the else if ladder, the switch statement. The ?: operator, the goto statement. The while, do, for statements, Jumps in loops.

Chapter - 5 Sections 5.1-5.9; Chapter - 6 Sections: 6.1-6.5

UNIT IV

Arrays, Character Arrays and Strings: Introduction one-dimensional, two-dimensional arrays, declaring and initializing them and string variables and Multi-dimensional arrays.

Chapter - 7 Sections 7.1-7.7; Chapter -8 Sections: 8.1, 8.2

UNIT V

User-Defined Functions: Introduction, need for user-defined function, a multi-function program, elements of user-defined functions, definition of functions, return values and their types, function calls, function declaration, category of functions, no arguments and no return values, arguments but no return values, arguments with return values, no arguments but returns a value, functions that return multiple values, nesting of functions, recursion. Passing arrays and strings to functions, the scope, visibility and life time of variables in functions.

Chapter – 9 Sections: 9.1-9.19.

BOOK FOR STUDY

E.Balaguruswamy, *Programming in ANSIC*, 6th edition, Tata-Mcgraw Hill Publishing.co

BOOKS FOR REFERENCE

1. Ananthi Sheshasayee, *Programming in C with Practical*, Margham Publications.
2. H. Schildt, Osborne, *Teach Yourself C*, McGraw Hill. New York.
3. Mullish Cooper, *The Spirit of C- An Introduction to Modern Programming*, 1998, Jaico Publishing House, Delhi.
4. Yashavantkanetkar, *Let us C*, 16th edition, BPB publication.
5. Dr.P.Rizwan Ahmed, *Programming in C*, 2016, Margham Publications.

OUTCOME OF LEARNING

Students will be able to

- Create algorithm to solve simple programming problems
- Design, implement and test programs that use loops, arrays, strings and functions.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108

B.Sc. - MATHEMATICS

ALLIED II PAPER II – MATHEMATICAL STATISTICS –II

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : IV

SUBJECT CODE: 19AAD

OBJECTIVE

This course aims to give the mathematical foundations of statistical inference.

UNIT I

Standard discrete distributions – Binomial and Poisson distribution- Fitting of Binomial and Poisson distribution.

Chapter - 7 Sections: 7.1, 7.2 (7.2.1, 7.2.2, 7.2.6, 7.2.7), 7.3(7.3.1, 7.3.2, 7.3.9)

UNIT II

Standard Continuous distributions – Uniform, Normal- Characteristics- Moment generating function – Moments - Area Property – Fitting of Normal distribution - Exponential distribution.

Chapter –8 Sections: 8.1, 8.2 (8.2.1, 8.2.2, 8.2.5, 8.2.7, 8.2.11, 8.2.14) & 8.6.

UNIT III

Sampling Introduction- Types of Sampling-Parameter and Statistic- Sampling Distribution- - Standard error-Test of significance-Null hypothesis-Alternative hypothesis-Type I & Type II errors- Critical region and level of significance - Test of Significance of Large samples – Test of significance for single proportion , difference of two proportions, single mean, difference of two means.

Chapter – 12 Sections: 12.1-12.14(omit sections 12.10, 12.11&12.15).

UNIT IV

Small Sample Tests -Exact test based on χ^2 distribution - Test of Independence of Attributes, Test of Goodness of fit - Exact test based on t and F distributions with regard to mean, variance and correlation coefficient

Chapter – 13 Sections: 13.1&13.5(omit 13.5.1),

Chapter – 14 Sections: 14.1,14.2 (14.2.6, 14.2.7, 14.2.8), 14.3

UNIT V

Analysis of Variance – one way classification – Two way classifications - Design of experiments.

Chapter – 17 & 18

BOOK FOR STUDY

S.C. Gupta and V.K. Kapoor, *Elements of Mathematical Statistics*, Third Edition, Sultan Chand & Sons.

BOOKS FOR REFERENCE

1. Dr.P.R.Vittal, *Mathematical Statistics*, Marghaum Publications.
2. S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons.
3. Goon Gupta A.M and Das Gupta, *Fundamentals of Statistics*, 1994, The World Press Private Limited, Calcutta
4. J.N.Kapur and H.C.Saxena, *Mathematical Statistics*, 1999, S.Chand and Company Ltd., New Delhi.

OUTCOME OF LEARNING

Students will be able to

- Identify discrete and continuous distributions and apply them in simple cases.
- Handle parametric testing problems for large and small samples.
- Recognize the importance and value of mathematical and statistical thinking, training, and approach to problem solving, on a diverse variety of disciplines.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

**ALLIED II PAPER II – STATISTICAL METHODS AND THEIR
APPLICATIONS-II**

(For Computer Science Students)
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6
CREDITS : 5

SEMESTER : IV
SUBJECT CODE: 19AAY

OBJECTIVE

To apply Statistical methods for Mathematical problems.

UNIT I

Sampling and Sample Designs: Theoretical Basis of Sampling – Methods of Sampling – Size of sample – Merits and Limitations of Sampling – Tests of Significance – Procedure and testing hypothesis – Standard error and sampling Distribution.

Chapter – 12: 12.1 – 12.12

UNIT II

Tests of significance for Large Samples.

Chapter – 12: 12.12 – 12.15

UNIT III

Tests of significance for Small Samples using t and F test of significance of coefficients of correlations.

Chapter – 14

UNIT IV

Chi-square tests – Ttest of goodness of fit and tests of independence of attributes.

Chapter – 13

UNIT V

Analysis of Variance: One way and Two way classification models.

Chapter – 17

BOOK FOR STUDY

S.C. Gupta and V.K. Kapoor, *Elements of Mathematical Statistics*, 3rd Edn, Sultan Chand & Sons.

BOOKS FOR REFERENCE

1. Dr.P.R. Vittal, *Mathematical Statistics*, Marghaum Publications
2. S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons
3. Goon Gupta A.M and Das Gupta, *Fundamentals of Statistics*, 1994, The World Press Private Limited, Calcutta
4. J.N.Kapur and H.C.Saxena, *Mathematical Statistics*, 1999, S.Chand and Company Ltd., New Delhi.

OUTCOME OF LEARNING

Students will be to understand the Statistical methods for Mathematical problems and developed their skills to solve the problems.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS
NON MAJOR ELECTIVE II – FUNCTIONAL STATISTICS
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 2

CREDITS : 2

SEMESTER : IV

SUBJECT CODE: 19NA2

OBJECTIVE

To impart ideas of basic concepts of index numbers, correlation and regression in statistics.

UNIT I

Index numbers: Uses of Index Numbers – Unweighted Index Numbers.

Chapter: 13 (Pg: 536 -548)

UNIT II

Weighted Index Numbers.

Chapter: 13 (Pg: 548 -557)

UNIT III

Correlation: Bivariate Distribution, Scatter diagram, Karl Pearson Coefficient of Correlation.

Chapter: 10 (Pg: 390 - 410)

UNIT IV

Rank correlation and regression lines: Rank correlation, Repeated rank correlation, Regression lines x on y and y on x .

Chapter: 10 (Pg: 416 – 424)

Chapter: 11 (Pg: 457 - 467)

BOOK FOR STUDY

P.R.Vittal, *Mathematical Statistics*, Margham Publications.

BOOKS FOR REFERENCE

1. S. P. Gupta, *Practical Statistics*, 2006, Sultan Chand & Sons, New Delhi.
2. MODE, E. B., *Elements of Statistics*, Prentice Hall
3. S.P. Gupta, *Statistical Methods (for CA intermediate)*, Sultan Chand & Sons.

OUTCOME OF LEARNING

Students will be to

- Understand the basic concepts and uses of Index numbers.
- Find the Correlation & Regression coefficients.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER IX – ABSTRACT ALGEBRA - I
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : V

SUBJECT CODE: 19CAJ

OBJECTIVE

To provide a first approach to Algebra which lays foundation for modern mathematics. To focus on the study of certain structures called groups, rings, fields and some related structures and also to develop proof-writing skills.

UNIT I

Definition of a Group – Some Examples of Groups - Some Preliminary Lemmas – Subgroups.

Chapter 2: 2.1 - 2.4.

UNIT II

A counting Principle - Normal Subgroups and Quotient groups- Homomorphisms.

Chapter 2: 2.5 - 2.7 (Omit Applications 1 and 2 of 2.7).

UNIT III

Automorphisms - Cayley's Theorem - Permutation Groups.

Chapter 2: 2.8 - 2.10.

UNIT IV

Definition and Examples of Rings – Some special Classes of Rings - Homomorphism - Ideals and Quotient Rings.

Chapter 3: 3.1-3.4.

UNIT V

More Ideals and Quotient Rings - Field of quotients of Integral domain – Euclidean rings.

Chapter 3: 3.5-3.7.

BOOK FOR STUDY

I.N.Herstein, *Topics in Algebra*, 2nd Edition, John Wiley & Sons, 2011.

BOOKS FOR REFERENCE

1. John B. Fraleigh, *A First Course in Abstract Algebra*, 7th Ed., Pearson, 2013.
2. David S. Dummit & Richard M. Foote, *Abstract Algebra*, 3rd Edition, Wiley India Pvt.Ltd, 2003.
3. J.J. Rotman, *Advanced Modern Algebra*, 2nd Edition, Graduate Studies in Mathematics, Vol. 114, AMS, Providence, Rhode Island, 2010.
4. J.Gallian, *Contemporary Abstract Algebra*, 8th Edition, Brooks/Cole, Cengage learning, 2012.
5. Qazi Zameeruddin & Surjeet Singh, *Modern Algebra*, 8th Edition Vikas Publishing, 2006.
6. www.ime.usp.br/~aholguin/LIVROS/Beachy.pdf.

OUTCOME OF LEARNING

Students will be able to

- Understand the connection and transition between previously studied mathematics and more advanced mathematics.
- Understand the elementary concepts of rings and fields and appreciate the similarities and differences between these concepts and those of group theory.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER X – REAL ANALYSIS - I
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : V

SUBJECT CODE: 19CAK

OBJECTIVE

To provide a comprehensive idea about real number system, convergence and divergence of sequences, series and to focus on limits in metric space this lays a foundation for analysis.

UNIT I

Sets and Functions: Sets and elements – Operations on sets – Functions – Real valued functions – Equivalence – Countability – Real numbers – Least upper bounds.

Chapter 1: Sections 1.1 to 1.7

UNIT II

Sequence of real numbers: Definitions of sequence and subsequence – Limit of a sequence – Convergent sequences - Divergent sequences – Bounded sequences – Monotone sequences – Operations on convergent sequences – Operations on divergent sequences.

Chapter 2: Sections 2.1 to 2.8

UNIT III

Sequence and Series of real numbers: Limit superior and Limit inferior – Cauchy sequences – Convergence and divergence - Series with non-negative terms – Alternating series.

Chapter 2: Sections 2.9 to 2.10, Chapter-3: Sections-3.1 to 3.3

UNIT IV

Series of real numbers: Conditional convergence and absolute convergence – Tests for absolute convergence – Series whose terms form a non-increasing sequence – The class ℓ^2 .

Chapter 3: Sections 3.4, 3.6, 3.7 and 3.10

UNIT V

Limits, Metric spaces and Continuous functions on Metric Spaces: Limit of a function on the real line – Metric spaces – Limits in metric spaces - Functions continuous at a point on the real line, reformulation, and functions continuous on metric spaces.

Chapter 4: Sections 4.1 to 4.3, Chapter 5: Sections 5.1 to 5.3.

BOOK FOR STUDY

Richard Goldberg, *Methods of Real Analysis*, Oxford and IBH Publishing, 1970.

BOOKS FOR REFERENCE

1. Dr. K. Chandrasekara Rao and Dr. K.S. Narayanan, *Real Analysis*, Vol.1, S. Viswanathan printers & publishers Pvt. Ltd.
2. Tom M. Apostol, *Mathematical Analysis*, 2nd Edition, Addison-Wesley New York, 1974.
3. Bartle, R.G. and Shebert, *Real Analysis*, John Wiley and Sons Inc., New York, 1976.

OUTCOME OF LEARNING

Students will be in the position to appreciate the beauty of the subject which serves as a stepping stone into the idea of abstract topological spaces.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER XI – MECHANICS – II
(For the students admitted from the year 2019-2020)

HOURS/WEEK: 6
CREDITS : 5

SEMESTER : V
SUBJECT CODE: 19CAL

OBJECTIVE

To introduce the concept of forces acting on moving objects and to understand their effect on velocity and acceleration. Further the concepts of smooth surfaces and their impacts, projectiles are introduced. Central orbits and moment of inertia are also dealt in detail to help in developing different designs.

UNIT I

Kinematics: Velocity – Resultant of v_1 and v_2 – Resultant Velocity – Acceleration – Velocity and acceleration in a rectilinear motion – Velocity and acceleration in a coplanar motion – Angular velocity – Relative angular velocity – Rectilinear motion when the acceleration is constant – Simple Harmonic Motion – Simple problems.

Chapter 1: Sections 1.2 to 1.4, Chapter 12: Section 12.1-12.3 only

UNIT II

Impact: Impulsive force – Impulse – Conservation of linear momentum – Impact of two smooth spheres – Direct impact of two smooth spheres – Impact of a smooth sphere on a fixed smooth plane – Oblique impact between two smooth spheres – Simple problems.

Chapter 14: Sections 14.1 to 14.5

UNIT III

Projectile: Forces on a projectile – Nature of a trajectory – Results pertaining to the motion of a projectile – Maximum horizontal range for a given velocity – Two trajectories with a given speed and a range-Projectile projected horizontally -Projectile projected on an inclined plane – Maximum range on an inclined plane.

Chapter 13: Sections 13.1, 13.2

UNIT IV

Central Orbits: Central force and Central orbit – Differential equation of a Central orbit – Laws of a central force – Methods to find the central orbits – Kepler's laws on Planetary motion – Simple problems.

Chapter 16: Sections 16.1 to 16.3

UNIT V

Moment of Inertia: Moment of Inertia – Theorems of parallel and perpendicular axes – M.I. of a triangular lamina, circular lamina, elliptic lamina, circular ring, right circular cone, sphere(hollow and solid) and rod.

Chapter 17: Section 17.1

BOOK FOR STUDY

P. Duraipandian, *Mechanics*, S. Chand Company Ltd., 2010.

BOOKS FOR REFERENCE

1. A.V. Dharmapadham, *Dynamics*, S. Viswanathan Publishers.
2. M.K. Venkatraman, *A Text Book on Dynamics*, 2001, Agasthiar Publications.
3. S.G Venkatachalapathy, *Dynamics*, Margham Publications.

OUTCOME OF LEARNING

Students will be able to understand the concept of forces acting on moving objects, velocity and acceleration, impacts, projectiles, central orbits, moment of inertia which helps in developing different designs.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER P1 – PROGRAMMING IN C PRACTICAL
(For the students admitted from the year 2019-2020)

HOURS/WEEK: 6

CREDITS : 5

SEMESTER : V

SUBJECT CODE: 19CA1

OBJECTIVE

To provide strong logical thinking and error free syntax code writing to master the debugging techniques and to present the results in neat form in C language.

UNIT – I:

To write and run the programs for the following problems:

To find the square of numbers from 1 to 20 using

1. For Loop.
2. While loop
3. Do-While loop
4. Go to statement

To generate the series for the following functions and to check the result using the corresponding built-in functions:

1. Sin x
2. Cos x
3. e^x

To count the number of vowels, consonants, words, whitespaces in a line of text and array of lines.

To reverse a string and check for the palindrome.

UNIT – II:

To enter two numbers and print all the prime numbers between them.

To compute the following using recursion and ternary operator.

1. The factorial of a number.
2. Binomial coefficient nCr where n and r are positive integers.
3. The n^{th} Fibonacci number from the Fibonacci series where n is an integer.

To perform:

1. Matrix addition and subtraction.
2. Matrix multiplication
3. Transpose of a matrix.
4. Determinant of a matrix.

To sort a given set of numbers in the ascending order by

1. Insertion sort.
2. Bubble sort.
3. Selection Sort.

UNIT – III:

To solve Algebraic and transcendental equations by

1. Bisection Method.
2. Newton Raphson Method.

Simple Problems:

To solve a system of linear simultaneous equations by Gauss Elimination Method.

UNIT – IV:

Simple problems:

1. To Interpolate using Lagrange's Formula for interpolation.
2. To Evaluate a definite integral using Simpson's one-third rule
3. To Solve an Ordinary Differential equation of first order by Runge-Kutta method of fourth order.

BOOKS FOR REFERENCE

1. E. Balagurusamy, *Programming in ANSI C*, 2nd edition, Tata Mcgraw hill co., 1996.
2. Ananthi Sheshasayee, *Programming in C with Practicals*, Margham Publications.
3. V. Rajaraman, *Computer Oriented Numerical Methods*, 3rd Edition, Prentice Hall of India.
4. Mullish Cooper, *The spirit of C*, Indian edition by Jaico publisher, 1987.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

ELECTIVE PAPER I – OPERATIONS RESEARCH – I
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : V

SUBJECT CODE: 19EAA

OBJECTIVE

To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and finding solutions to these problems. To understand the concept of solving the Linear Programming Problems and application to transportation, assignment, job sequencing and game theory.

UNIT I

LPP & Formulation: Introduction to OR-Definition – Scope – Phase – Limitations of OR- Types of models – Linear Programming: Formulation – Graphical method of solution.

Chapter- 1, 2 and 3

UNIT II

The Simplex method: Simplex algorithm – Simplex computational procedure – Artificial variables – Charne's method of penalties

Chapter- 4 except two phase method (4.1 – 4.5)

UNIT III

Transportation Problem: Application and solution of transportation problems – Degeneracy in transportation problems – Unbalanced transportation problems.

Chapter- 10.1 -10.13

UNIT IV

Assignment Problem: Assignment algorithm-solution of assignment Problems – Unbalanced assignment problems. Travelling salesman problem. Sequencing: Sequencing problem with (i) n jobs and two machines, (ii) n jobs and three machines, (iii) n jobs and m machines. Two jobs through m machines (Graphical solution)

Chapter- 11.1-11.4, 11.7, 12.1 – 12.6

UNIT V

Two person zero sum games – The Maximin-Minimax Principle – Games without saddle points – Mixed Strategies – Graphical solution of $2 \times n$ and $m \times 2$ games – Dominance property.

Chapter - 17.1 -17.7

BOOK FOR STUDY

Kanti Swarup, P.K. Gupta, Man Mohan, *Operations Research*, 9th Edition, Sultan Chand & Sons.

BOOKS FOR REFERENCE

1. Gupta P.K and D.S. Hira, *Operations Research*, S Chand and Company
2. Prof.Dr.V.Sundaresan,K.S.GanapathySubramanianand K.Ganesan, *Resource Management Techniques*,A.R.Publications.
3. S.K. Mittal &B.S Goel, *Operations Research*,Pragati Prakashan, Meerut.

OUTCOME OF LEARNING

Students will be able to develop computational skill and logical thinking in formulating linear Programming Problems and solving them. They have also learnt the applications to transportation, assignment, job sequencing and game theory.

OBJECTIVES

This course introduces curve fitting to the students and its applications with numerical solution of ordinary and partial differential equations.

UNIT I: The solution of nonlinear equations $f(x)=0$. The solution of linear system $AX = B$.
Chapter 2: sec 2.1 to 2.4, and 2.6- 2.7
Chapter 3: sec 3.3 to 3.7

UNIT II: Interpolation and polynomial approximation - Curve fitting.
Chapter 4: sec 4.1 to 4.4
Chapter 5: sec 5.1 to 5.2

UNIT III: Numerical differentiation - Numerical integration.
Chapter 6: sec 6.1, 6.2
Chapter 7: sec 7.1 to 7.2

UNIT IV: : Solution of ordinary differential equations
Chapter 9: sec 9.1 to 9.6

UNIT V : Solution of partial differential equations
Chapter 10: sec 10.1 to 10.3

BOOK FOR STUDY

Numerical Methods for Mathematics, Science and Engineering - John H. Mathews,
2nd edition, Prentice Hall, New Delhi, 2003.

BOOKS FOR REFERENCE

1. Conte S.D and Carl de Boor (1980)- *Elementary Numerical Analysis, An Algorithmic Approach*, Mc.Graw Hill, New York.
2. James B. Scarborough- *Numerical Mathematical Analysis*, Sixth Edition, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

OUTCOME OF LEARNING:

Students will able to develop skills in solving problems numerically which cannot be solved analytically.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108.
B.Sc – MATHEMATICS

CORE ELECTIVE PAPER - I GRAPH THEORY
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6
CREDITS : 5

SEMESTER :V
SUBJECT CODE: 19EAC

OBJECTIVES: This course introduces Planar Graphs, Representations of Graphs, colouring, covering Partitioning and Directed graphs.

UNIT I: INTRODUCTION TO GRAPHS
Graphs-subgraphs-types of graphs-connected graphs-trees.
Chapter- 2 and 3

UNIT II: PLANAR AND DUAL GRAPHS
Planar Graphs-Kuratowski's Two Graphs-Representations of a Planar graphs-
Detection of Planarity-Geometric Dual-Combinatorial Dual.
Chapter-5: 5.2-5.7.

UNIT -III: MATRIX REPRESENTATION OF GRAPHS
Incidence Matrix-Submatrices of $A(G)$ - Circuit Matrix-Fundamental circuit Matrix
and Rank of B-Applications to switching network.
Chapter 7: 7.1-7.5.

UNIT -IV: COLOURING ,COVERING AND PARTITIONING
Chromatic Number- Chromatic partitioning- Chromatic polynomial-Matchings.
Chapter 8: 8.1-8.4.

UNIT -V: DIRECTED GRAPHS
Directed graph - Types of Digraphs - Digraphs and Binary Relations - Directed Paths
and Connectedness - Euler Digraphs. Fundamental circuits in Digraphs -Adjacency
Matrix of a Digraphs.
Chapter 9: 9.1-9.8.

BOOK FOR STUDY:

Narsingh Deo -*Graph Theory with applications to Engineering and Computer Science*
PHI Learning Pvt.,Ltd.2019.

BOOKS FOR REFERENCE:

1. Choudum.S.A. - *A First Course In Graph Theory*, Macmillan India Limited, 1987.
2. Arumugam.S and S. Ramachandran, - *Invitation to Graph Theory*, Scitech publications
India Pvt. Limited, Chennai - [2001, Edition].

OUTCOME OF LEARNING:

Students will able to acquire knowledge in basic concepts in graph theory and its applications.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108

B.Sc. - MATHEMATICS

CORE PAPER XII – ABSTRACT ALGEBRA - II

(For the students admitted from the year 2019-2020)

HOURS/WEEK: 6

CREDITS : 5

SEMESTER : VI

SUBJECT CODE: 19CAM

OBJECTIVE

To master the properties of transformations between vector spaces and understand how they are connected with matrices in linear transformations. To determine the dimension of spaces associated with matrices and linear transformations.

UNIT I

Vector Spaces–Elementary Basic Concepts - Linear independence and Bases.

Chapter 4: 4.1 and 4.2.

UNIT II

Dual Spaces - Inner product spaces.

Chapter 4: 4.3 and 4.4.

UNIT III

The algebra of linear transformations- Minimal polynomial – Regular and singular transformations – Rank of a linear transformation.

Chapter 6: 6.1

UNIT IV

Characteristic roots – Matrices.

Chapter 6: 6.2 and 6.3.

UNIT V

Canonical forms – Triangular form.

Chapter 6: 6.4.

BOOK FOR STUDY

I.N.Herstein, *Topics in Algebra*, 2nd Edition, John Wiley & Sons, 2011.

BOOKS FOR REFERENCE

1. P.B. Bhattacharya, S.K. Jain, S.R. Nagpaul, *First Course in Linear Algebra*, 2nd Edition, Cambridge University Press, 1994.
2. Kenneth M Hoffman and Ray Kunze, *Linear Algebra*, 2nd Edition, Prentice-Hall of India Pvt. Ltd, New Delhi, 2013.
3. J.J. Rotman, *Advanced Modern Algebra*, 2nd Edition, Graduate Studies in Mathematics, Vol. 114, AMS, Providence, Rhode Island, 2010.
4. John B. Fraleigh, *A First Course in Abstract Algebra*, 7th Ed., Pearson, 2002.

OUTCOME OF LEARNING

Students will be able to find the matrix representation of a linear transformation given bases of the relevant finite dimensional vector spaces.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

CORE PAPER XIII – REAL ANALYSIS – II
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : VI

SUBJECT CODE: 19CAN

OBJECTIVE

To learn the fundamentals of continuity, connectedness, completeness, compactness in metric spaces and to study about Riemann integration, application of Rolle's theorem and Taylor's theorem.

UNIT I

Continuous functions on metric spaces: Open sets - closed sets - Discontinuous functions on the real line.

Chapter 5: Sections-5.4 to 5.6

UNIT II

Connectedness and Completeness: More about open sets - Connected sets - Bounded sets and totally bounded sets - Complete metric spaces.

Chapter -6: Sections 6.1 to 6.4

UNIT III

Compactness: Compact metric spaces - Continuous functions on a compact metric spaces - Continuity of the inverse functions - Uniform continuity.

Chapter 6: Sections-6.5 to 6.8

UNIT IV

Calculus: Sets of measure zero - Definition of the Riemann integral - Existence of the Riemann integral (Statement only) - Properties of the Riemann integral – Derivates - Rolle's theorem - , The law of the mean - Fundamental theorem of calculus.

Chapter 7: Sections 7.1 to 7.8

UNIT V

Taylor Series & Sequence and Series of functions: Taylor's theorem- Point wise convergence of sequences of functions - Uniform convergence of sequences of functions.

Chapter 8: Section 8.5 only and Chapter 9: Sections 9.1 and 9.2

BOOK FOR STUDY

Richard R. Goldberg, *Methods of Real analysis*, Oxford & IBH Publishing, 1970.

BOOK FOR REFERENCE

1. Tom M. Apostol, *Mathematical Analysis*, 2nd Edition, Addison-Wesley New York, 1974.
2. R. Bartle and Sherbert, *Real Analysis*, 5th Edn., Wiley and Sons.

OUTCOME OF LEARNING

Students will be able to gain knowledge about the nature of functions, differentiation and Riemann integration and its application.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108

B.Sc. - MATHEMATICS

CORE PAPER XIV – COMPLEX ANALYSIS

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : VI

SUBJECT CODE: 19CAP

OBJECTIVE

To introduce the fundamental ideas of the functions of complex variables and developing a clear understanding of the concepts of complex analysis this will allow students to work effectively.

UNIT I

Analytic Functions: Introduction to Functions of a complex variable, Limits, Continuity, Derivatives. Cauchy- Riemann equations - sufficient conditions for Differentiability – polar coordinates – Analytic functions – Examples – Harmonic functions

Chapter 2: Sec 12, 15, 18, 19, 21 – 26.

UNIT II

Integrals: Definite integrals of functions – Contours – Contour integrals – Some examples – Antiderivatives – Cauchy's Goursat Theorem (Statement only) – Cauchy's integral formula – An extension of the Cauchy's integral formula – Some consequences of the extension - Liouville's Theorem and Fundamental Theorem of algebra – Maximum modulus principle.

Chapter 4: Sec 38 – 41, 46, 50 – 54.

UNIT III

Power Series: Taylor series – examples – Laurent series – examples – Absolute and Uniform convergence of power series – Continuity of sums of power series.

Chapter 5: Sec 57-64.

UNIT IV

Residues and Poles: Residues – Cauchy residue theorem – The three types of isolated singular points – Residues at poles – Examples – Zeros of Analytic functions – Zeros and poles - Evaluation of improper integrals – Example – Improper integrals from Fourier analysis – Jordan's lemma (Statement only)– Definite integrals involving sines and cosines.

Chapter 6: Sec 69, 70, 72 – 76.

Chapter 7: Sec 78 – 81, 85.

UNIT V

Mappings: Mappings – Mappings by the exponential function - Linear transformations – The transformation $\omega = 1/z$ – Mappings by $1/z$ – Linear fractional transformations – An implicit form – The transformation $\omega = \sin z$ – Mappings by z^2 and Branches of $z^{1/2}$ – Conformal mapping – Harmonic conjugates.

Chapter 2: Sec 13, 14

Chapter 8: Sec 90 – 94, 96, 97.

BOOK FOR STUDY

James Ward Brown, Ruel V.Churchill, *Complex variables and Applications*, Eighth Edition, McGraw-Hill Publications, New Delhi.

BOOKS FOR REFERENCE

1. T.K.Manicavachagom Pillai, Dr.S.P.Rajagopalan and Dr.R.Sattanathan, *Complex Analysis* , S.Viswanathan Publishers Pvt. Ltd, 2008.
2. P. Duraipandian and LaxmiDuraipandian, *Complex Analysis*,(1976),Emerald Publishers, Chennai.
3. S. Ponnusamy, *Foundations of Complex Analysis*,(2000), Narosa Publishing House, New Delhi.
4. Murray R. Spiegel, *Theory and Problems of Complex Variable*,(2005) Tata-Mcgraw Hill Edition, New Delhi.
5. S.G.Venkatachalapathy, *Complex Analysis*,Margham Publications.

OUTCOME OF LEARNING

Students will be able to understand the significance of differentiability and analyticity of complex functions leading to the Cauchy Riemann equations, mapping, Cauchy's Integral formulae, power series and classify the nature of singularity, poles and residues and application of Cauchy Residue theorem.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

ELECTIVE PAPER-II – OPERATIONS RESEARCH - II
(For the students admitted from the year 2019-2020)

HOURS/WEEK: 6
CREDITS : 5

SEMESTER : VI
SUBJECT CODE: 19EAD

OBJECTIVE

To understand the concepts of duality and network analysis. To study the application in replacement and inventory theory.

UNIT I

Introduction to Duality – general primal – dual pair – formulating a dual problem – Primal dual pair in matrix form – Dual simplex method – Simple Problems.

Chapter 5 - Section: 5.1 -5.4, 5.9

UNIT II

Replacement Problem: Replacement of items that deteriorate with time-Replacement of items that fail completely.

Chapter18 - Section: 18.1 – 18.3

UNIT III

Network Analysis – Basic concepts – Drawing network diagrams – Critical Path method – PERT – Algorithm for PERT, Difference between PERT & CPM.

Chapter- 25 Section: 25.1 – 25.8

UNIT IV

Inventory: Deterministic problems – Inventory control – Definition – Problems with (i) Uniform rate of demand, infinite rates of production no shortages, (ii) Uniform rate of demand, finite rates of replenishment no shortages, (iii) Uniform rate of demand, instantaneous production with shortages and (iv) Uniform rate of demand, instantaneous production with shortages and fixed time

Chapter 19: Section: 19.1 – 19.11

UNIT V

Probabilistic Models – Newspaper boy problem – Discrete and continuous type cases. Inventory control with one price break and two price breaks.

Chapter- 19.12

BOOK FOR STUDY

Kanti Swarup, P.K. Gupta, Man Mohan, *Operations Research*, 9th Edition, Sultan Chand & Sons.

BOOKS FOR REFERENCE

1. Gupta P.K and D.S. Hira, *Operations Research*, S Chand and Company
- 2 .Prof V.Sundaresan, K.S.Ganapathy Subramanian and K.Ganesan, *Resource Management Techniques*, A.R.Publications.
- 3.S.K. Mittal &B.S Goel, *Operations Research*, Pragati Prakashan, Meerut.
- 4.A.Rahim Basha, *Basic Graph Theory with Applications*,Sri Hariganesh Publications LLP 1st Edition.

OUTCOME OF LEARNING

Students will be able to

- Apply the concepts of duality in solving LPP.
- Understand the mathematical tools and models that are needed to solve optimization problems.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108.
B.Sc – MATHEMATICS

CORE ELECTIVE PAPER – II FUZZY MATHEMATICS
(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6
CREDITS : 5

SEMESTER :VI
SUBJECT CODE: 19EAE

OBJECTIVES:

This course introduce the basic concepts of fuzzy sets, fuzzy graphs and their relations. Also it aims to develop the skills in solving fuzzy problems and it's applications.

UNIT-I :

Fundamental Notions.
Chapter I: Sec. 1 to 8

UNIT-II :

Fuzzy Graphs.
Chapter II: Sec. 10 to 17

UNIT-III :

Fuzzy Relations.
Chapter II: Sec. 19 to 26

UNIT-IV :

Fuzzy Logic.
Chapter III: Sec.31 to 36 and 39

UNIT-V :

The Laws of Fuzzy Composition.
Chapter IV: Sec.43 to 49

BOOK FOR STUDY:

A.Kaufman, *Introduction to the theory of Fuzzy subsets*, Vol.I. Academic Press, New York, 1975.

BOOK FOR REFERENCE:

1. H.J.Zimmermann, *Fuzzy Set Theory and its Applications*, Allied Publishers, Chennai, 1996
2. George J.Klir and Bo Yuan, *Fuzzy sets and Fuzzy Logic-Theory and Applications*, Prentice Hall India, New Delhi, 2001.

OUTCOME OF LEARNING: Students will be able to solve problems in fuzzy logic and its composition.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108.

B.Sc - MATHEMATICS

CORE ELECTIVE PAPER - II ELEMENTARY NUMBER THEORY

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : VI

SUBJECT CODE: 19EAF

OBJECTIVES:

This course introduce the basic concepts of Congruences, Arithmetic Functions, Groups, Rings and Fields.

UNIT-I :

Introduction - Divisibility - Primes - Congruence - Solution of Congruences
Chapter:1 :1.1-1.3, Chapter:2 :2.1-2.2

UNIT-II :

Chinese Remainder Theorem, Number Theory from an Algebraic view
point, Groups, Rings and Fields.
Chapter:2 :2.3,2.10,2.11.

UNIT-III

Quadratic Residues- Quadratic reciprocity- The Jacobi symbol.
Chapter:3 : 3.1,3.2,3.3.

UNIT-IV :

Greatest integer function, Arithmetic Functions, The Mobius Inversion formula.
Chapter:4:4.1-4.3

UNIT-V :

The simple continued fractions-Euclidean algorithms-Uniqueness-infinite continued
fraction Chapter:7: 7.1,7.2,7.3.

BOOK FOR STUDY

An Introduction to the Theory of Numbers by Ivan Niven, Herbert S. Zuckerman and Hugh
L. Montgomery 5th Edition, Wiley Student Edition, New Delhi, 1991.

BOOK FOR REFERENCE:

1. David N. Burton, "Elementary Number Theory", 6th Edition, Tata McGraw HILL Publishers
2008.
2. Kumaravelu. S and Susheela Kumaravelu - *Elements of Number Theory*, Nagarcovil, 2002.

OUTCOME OF LEARNING :

Students acquire knowledge in basic concepts of number theory

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108
B.Sc. - MATHEMATICS

ELECTIVE PAPER-III - DISCRETE MATHEMATICS

(For the students admitted from the year 2019-2020)

HOURS/WEEK: 6

CREDITS : 5

SEMESTER :VI

SUBJECT CODE: 19EAG

OBJECTIVE

To introduce logics and inference theory for understanding and applying them in real life. To familiarize students with Lattices, Boolean algebra and Graph Theory and apply logical reasoning to solve a variety of problems.

UNIT I

Mathematical logic – statements and notations – connectives - Normal forms.

Chapter: 1 - Sections: 1.1, 1.2 (1.2.1 -1.2.11 except 1.2.5), 1.3 (1.3.1 -1.3.4).

UNIT II

Theory of inference for the statement calculus -The predicate calculus.

Chapter: 1 - Sections: 1.4 (1.4.1 – 1.4.3), 1.5 (1.5.1 – 1.5.5).

UNIT III

Lattices and Boolean Algebra- Lattices as posets – Boolean algebra – Boolean function.

Chapter: 4 – Sections: 4.1 to 4.3.

UNIT IV

Graph theory – Basic definition – Some special simple graphs – Subgraphs – Isomorphic graphs – Matrix representation of graphs – Paths, cycles, connectivity (Excluding algorithms).

Chapter: 7 (Pg. No. 366 – 391).

UNIT V

Eulerian and Hamiltonian graphs – Connectedness in directed graphs – Trees – Some properties of trees – spanning trees – Rooted and Binary trees – Properties of Binary trees – Tree traversals. (Excluding algorithms)

Chapter: 7 (Pg. No. 392 - 421).

BOOKS FOR STUDY

1. J.P. Tremblay and R. Manohar, *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw – Hill publishing company Ltd.
2. T. Veerarajan, *Discrete Mathematics with Graph Theory and Combinatorics*, McGraw Hill Education (India) Private Ltd.

BOOKS FOR REFERENCE

1. Venkataraman M.K. and others, *Discrete Mathematics*, 2000, The National Publishing Company.
2. Richard Johnsonbaugh, *Discrete Mathematics*, Fifth Edn., Pearson Education Asia, New Delhi .

OUTCOME OF LEARNING

Students will be able to understand the basic principles of logic, Lattices, Boolean algebra, Graph Theory and Inference Theory to real life situations in the form of graphs.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108.

B.Sc – MATHEMATICS

CORE ELECTIVE PAPER – III ASTRONOMY

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 6

CREDITS : 5

SEMESTER : VI

SUBJECT CODE: 19EAH

OBJECTIVES:

To introduce the exciting world of astronomy to the students and to help them to study Spherical Trigonometry, movement of Celestial objects, Kepler's laws and phase of moon.

UNIT-I

Spherical Trigonometry: Spherical Triangle-The fundamental formulae of Spherical Trigonometry, the sine, cosine four parts and Napier formulae (without proof).
Chapter I Pages:1-37.

UNIT-II

The Celestial Sphere: Celestial coordinators - Diurnal motion - Rising and setting of a star - Sidereal time - Circumpolar star - Morning and Evening stars - Twilight - Earth - Length of the day.

Chapter:II &III Pages: 38-131.

UNIT-III

Refraction - Tangent Formula - Cassini's formula - Effects of Refraction - Geocentric Parallax - Effects of Geocentric Parallax - Heliocentric Parallax - Effects of Heliocentric Parallax - Aberration - Its Effects.
Chapter-IV & V Pages: 140-170.

UNIT-IV

Kepler's Laws - Verification of Kepler's Laws - True anomaly, Mean Anomaly - Eccentric Anomaly, Relation between them - Time - Equation of Time - Seasons - Conversion of Time.
Chapter-VI & VII Pages: 172-213.

UNIT-V

The Moon - Sidereal Month, Lunation and Relation between them - Phases of the Moon - Lunar Libration - Surface of the Moon - Metonic Cycle - Tides - Eclipses :- Shadow Cone - Minimum and Maximum number of Eclipses.
Planetary Phenomena - Bodes law - Elongation - Sidereal Period, Synodic period and the relation between them - Phase - Stationary Points - Solar System - Stellar Universe - A brief history of Astronomy.

Chapters: XII,XIII,XIV,XV,XVI Pages: 334-527.

BOOKS FOR STUDY

Kumaravelu. S and Susheela Kumaravelu - *Astronomy for degree classes*, Part-I and Part-II
Rainbow printers, Nagarcovil (2005).

BOOKS FOR REFERENCE

1. Ramachandran. G.V. - *Astronomy*
2. George.O.Abell - *Exploration of the Universe* (Second Edition).

OUTCOME OF LEARNING: Students will get knowledge in analyse the various topics in astronomy.

BHARATHI WOMEN'S COLLEGE(AUTONOMOUS),CHENNAI-600 108.
B.Sc – MATHEMATICS

CORE ELECTIVE PAPER – III COMBINATORIAL MATHEMATICS

(For the students admitted from the year 2019-2020)

COURS/WEEK : 6

CREDITS : 5

SEMESTER :VI

SUBJECT CODE: 19EAJ

OBJECTIVES:

To introduce Permutations and Combinations, Generating Functions, Recurrence Relation. This course concentrates on Mathematical induction and principle of inclusion and exclusion.

UNIT-I

Permutations and Combinations: Introduction - The Rules of Sum and Product - Permutations - Combinations - Pascal's Identity, Vandermonde's Identity.
Chapter:6 Sections:1-4

UNIT-II

Permutation with repetition- circular permutation- pigeonhole principle -generalization of pigeonhole principle.
Chapter:6 Sections:5-7

UNIT-III

Generating Functions: Introduction - Generating Functions of Combinations - Enumerators for Permutations - Distributions of Distinct Objects into Non distinct Cells - Partition of Integers.
Chapter:6 Section:14

UNIT-IV

Recurrence Relation: Mathematical induction- Linear Recurrence Relation with Constant Coefficients -Solution by the Technique of Generating Functions.
Chapter:6 Sections:11-13

UNIT-V

The Principles of Inclusion and Exclusion: Introduction - The Principle of Inclusion and Exclusion - The General Formula -Derangements -Simple Problems.
Chapter:6 Sections: 8-10

BOOK FOR STUDY:

1. Veerarajan-*Discrete mathematics with Graph theory and Combinatorics*. (2nd edition)McGraw – Hill Education(India) Pvt. company.

BOOKS FOR REFERENCE:

1. C.L.Liu -*Introduction to Combinatorial Mathematics*, McGraw – Hill Book company.
2. Santha.S – *Discrete mathematics with Combinatorics and Graph theory* 2012.

OUTCOME OF LEARNING: Student will able to understand the concepts of Permutations and Combinations, Generating Functions, Recurrence relation and principle of inclusion and exclusion.

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI - 500 108.

B.A./B.Sc./B.Com.

GENERAL ENGLISH PAPER- I

(For the students admitted from the year 2019)

HOURS PER WEEK : 4

SEMESTER : I

CREDITS : 3

SUBJECT CODE : 19GEA

OBJECTIVES:

- To provide the students with an enjoyable literary experience through the genres like Prose, Poetry, Biography, Short Story And One Act Plays.
- To ensure an appreciable level of skill acquisition among students.

UNIT- I: POETRY

- 1) The Village School Master - Oliver Goldsmith
- 2) The House of My Childhood - Dilip Chitre

UNIT- II: PROSE

- 1) Dream Children: A Reverie - Charles Lamb
- 2) The Beauty Industry - Aldous Huxley

UNIT- III: SHORT STORY

- 1) The Blind Dog - R. K. Narayan

UNIT- IV: GRAMMAR

- 1) Tense - Identification of Tense
- 2) Articles - Fill in the Blanks
- 3) Parts of Speech - Identification

UNIT- V: COMPOSITION

- 1) Reading Comprehension (Textual)
- 2) Hint Development

BOOK FOR STUDY:

WORLD VIEW – Manspring Publication

BOOKS FOR REFERENCE:

- High School English: Grammar And Composition – Wren A. Martin
- A Junior English Grammar And Composition – S. K. Aggarwal

LEARNING OUTCOMES:

On completion of this course the students

- Familiarize themselves with basics of English through the literary texts from different genres
- Progress effectively in fundamental usage of Grammar
- Writing skills are tuned through Composition exercises

BHARATHI WOMEN'S COLLEGE (AUTONOMOUS), CHENNAI – 600 108.

B.A./B.Sc./B.Com.

GENERAL ENGLISH PAPER II

(For the students admitted from the year 2019)

HOURS PER WEEK : 4

SEMESTER : II

CREDITS : 3

SUBJECT CODE : 19CEB

OBJECTIVES:

- To enable students to communicate effectively in English.
- To fine tune reading and writing skills with emphasis on basic grammar.

UNIT- I: POETRY

- 1) A Poison Tree - William Blake
- 2) The Professor - Nissim Ezekiel

UNIT- II: PROSE

- 1) I Won't Let Him Go - Madhavas Kutty
- 2) The Beautiful - Ruskin Bond

UNIT- III: BIOGRAPHY

- 1) Dr. Ambedkar

UNIT- IV: GRAMMAR

- 1) Tense - Writing Sentences
- 2) Article - Cloze Test
- 3) Parts of Speech - Fill in the blanks with the suitable parts of speech

UNIT- V: COMPOSITION

- 1) Reading Comprehension
- 2) Letter Writing - Requisition Letter for Transfer Certificate or Bonafide Certificate or Attendance Certificate

BOOK FOR STUDY:

WORKTEXT VIEW – 1st Edition Publication

BOOKS FOR REFERENCE:

- High School English Grammar And Composition - Wren & Martin
- A Guide to English Grammar And Composition - Anil Agarwal

LEARNING OUTCOME:

On completion of this course the students

- Enter into next phase of learning English through interesting texts
- Gain more skills in the application of Grammar
- Enhance writing skills through composition

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GENERAL ENGLISH PAPER III

(For the students admitted from the year 2019)

HOURS PER WEEK : 4

SEMESTER - III

CREDITS : 3

SUBJECT CODE : 19GEC

OBJECTIVES:

- To enhance language learning through literature.
- To prepare the students for employability.

UNIT- I: POETRY

- 1) Red, Red, Red Rose - Robert Burns
- 2) Poor Girl - Maya Angelo
- 3) Clouds and Waves- Rabindranath Tagore

UNIT- II: PROSE

- 1) My Greatest Olympic Prize - Jesse Owens
- 2) A Simple Philosophy - Seane
- 3) Toasted English - R K Narayan

UNIT- III: EXTENSIVE READER

- 1) Mother's Day - J. B. Priestley
- 2) Diamond Necklace - Guy De Maupassant

UNIT- IV: GRAMMAR

- 1) Voice- Identification
- 2) Question Tag (with options)
- 3) Degrees of Comparison- Identification

UNIT- V: COMPOSITION

- 1) Reading Comprehension
- 2) Letter Writing - Asking permission to attend competition / Permission to go home.

BOOK FOR STUDY:

WOR (L) D V E W - Macspring Publication

BOOKS FOR REFERENCE:

- High School English Grammar And Composition - Wren & Martin
- A Junior English Grammar And Composition - M. K. Agarwal

LEARNING OUTCOME:

On completion of this course the students

- Enrich themselves in basic English by absorbing the themes Characters and Life narratives
- Move in a well-defined Grammar-learning phase
- Augment their writing skills through composition

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GENERAL ENGLISH PAPER IV

(For the students admitted from the year 2019)

HOURS PER WEEK : 4

SEMESTER : IV

CREDITS : 5

SUBJECT CODE : 19G+D

OBJECTIVES:

- To create an interest among students towards English language learning and making it a continuous process in life.
- To equip the students with the skills required for employability.

UNIT - I: POETRY

- 1) A Little Boy's Dream – Katherine Mansfield
- 2) This is Going to Hurt just a Little - Ogden Nash
- 3) All Is Life – Ruskin Bond

UNIT- II: PROSE

- 1) To Know When to Say "It's None of Your Business" - Mark Twain
- 2) Lottery Ticket - Anton Chekov
- 3) How To Be A Doctor - Stephen Leacock

UNIT- III: EXTENSIVE READER

- 1) Refund - Fritz Krithy
- 2) Karma – Khushwant Singh

UNIT- IV: GRAMMAR

- 1) Voice - Conversion of Sentences
- 2) Reported Speech
- 3) Degree of Comparison - Conversion of Sentences

UNIT- V: COMPOSITION

- 1) Job Application with Cover Letter & CV
- 2) Lodging Complaints

BOOK FOR STUDY:

WORLD VIEW – Mansring Publication

BOOKS FOR REFERENCE:

- High School English Grammar And Composition – Wren & Martin
- A Junior English Grammar And Composition – M. K. Agarwal

LEARNING OUTCOME:

On completion of this course the students

- Benefit with a wide range of English learning through Literary texts
- Strengthen their Grammar skills
- Are facilitated to write in simple English meaningful to their day to day situations

SKILL BASED ELECTIVE – ENGLISH FOR COMMUNICATION I

(For the students admitted from the year 2019)

HOURS PER WEEK : 2

SEMESTER : I

CREDITS : 2

SUBJECT CODE : 19SZ1

OBJECTIVES:

- To enable the student
 - shed inhibitions and gain confidence
 - acquire proficiency in language.

ORAL COMPONENT

UNIT I

Greeting, Introducing, Seeking Permission

UNIT II

Telephone Etiquettes
Handling Calls – Mock Calls

UNIT III

Reading and Responding

WRITTEN COMPONENT

UNIT I

Giving Instructions and Directions

UNIT II

Leaving a Message
Asking for / Giving Message

UNIT III

Dialogue Writing(Guided)

- At an interview hall
- At the service centre
- In the library
- At the bank
- Making an apology

U.

Descriptive Writing (Guided)

Technical: (Features of a Cell Phone, Laptop, Camera, Television, Fridge)

UNIT V

Descriptive Writing (Guided)

General: (Describing your locality/town/village, library, college campus, a place of historical importance, a festival.)

BOOKS FOR STUDY:

1. Spoken English for You by Radhakrishna Pillai, Emerald Publishers
2. Creative English For Communication by N. Krishnaswamy & T. Sriraman, Macmillan
3. Developing Communication skills by Krishna Mohan & Meera Banerji, Macmillan

BOOKS FOR REFERENCE:

1. Form and Function by V. Sankaranar and V. Snyamaia, Emerald Publishers
2. Developing Communication Skills by Krishna Mohan and Meera Bannerjee, Macmillan
3. Functional English by Dr. Malathi, New Century Book House

LEARNING OUTCOME:

On completion of this course the students

- Acquire the basics of Speaking and Presentation skills
- Understand the importance Non-verbal communication, gestures and general work place ethics
- Develop Writing skills for official purpose

6.

Descriptive Writing (Guided)

Technical (Features of a Cell Phone, Laptop, Camera, Television, Fridge)

UNIT V

Descriptive Writing (Guided)

General (Describing your locality/town/city library, college campus, a place of historical importance, a festival)

BOOKS FOR STUDY:

1. Spoken English for You by Radhakrishna Pillai, Emerald Publishers
2. Creative English For Communication by M. Krishnaaswamy & T. Srinivasan, Macmillan
3. Developing Communication Skills by Krishna Mohan & Meera Banerji, Macmillan

BOOKS FOR REFERENCE:

1. Form and Function by V. Sasikumar and V. Shyamala, Emerald Publishers
2. Developing Communication Skills by Krishna Mohan and Meera Banerjee, Macmillan
3. Functional English by Dr. Malathi, New Century Book House

LEARNING OUTCOME:

On completion of this course the students

- ◆ Acquire the basics of Speaking and Presentation skills
- ◆ Understand the importance Non-verbal communication, gestures and general work place ethics
- ◆ Develop Writing skills for official purpose

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SKILL BASED ELECTIVE – ENGLISH FOR COMMUNICATION II

(For the students admitted from the year 2019)

HOURS PER WEEK : 2

SEMESTER : II

CREDITS : 2

SUBJECT CODE : 195/2

OBJECTIVE:

- To equip the graduating students with skills essential for the workplace and facilitate a smooth mobility from the institution to the industry.

ORAL COMPONENT

UNIT I

Impromptu Talks

UNIT II

Group Discussion

UNIT III

Mock Interview (FAQs)

WRITTEN COMPONENT

UNIT I

Interviews

Managing nonverbal cues

UNIT II

Publicity Literature - Writing / Responding to Advertisements

UNIT III

Essay writing- Argumentative Essays (Guided)

Cell Phones/ Technology a boon or a bane

Role of youth in politics

Mother tongue as the medium of instruction

Dress code in colleges

Social Media – a distraction

Today's Youth: 'useless or used less'?

UNIT IV

Reporting Events – Sports Day, Association Meeting, Cultural Celebration.

UNIT V

Business Letters- Requests, Complaints, Placing Orders

BOOKS FOR STUDY:

1. Developing Communication Skills by Krishna Mohan & Meera Banerji, Macmillan
2. English for Business Communication by Dr. T.M. Farhatullah, Prism Books Pvt. Ltd.,
3. English for Competitive Exams by R.P. Bhatnagar

BOOKS FOR REFERENCE:

1. English and Softskills by S.P. Dhanavel, Orient Blackswan
2. Art of Interviewing by H.S Bhatia, Ramesh Publishing House, New Delhi
3. Written English for You by Radhakrishna Pillai & Rajeevan, Emerald Publishers

LEARNING OUTCOME:

On completion of this course the students

- comprehend the significance of Interviewing and Group Discussion skills
- Develop an inclination towards argument and knowledge of the current topics which are most debated
- Learn Basic approaches to communication skills and prepare themselves for their careers

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ENVIRONMENTAL STUDIES

கற்றுக்கொடுக்கப்படும் கல்வி

(For the students admitted from the year 2019-20)

HOURS PER WEEK: 3

SEMESTER: I

CREDITS: 2

SUBJECT CODE: 19EVS

Objective

1. To develop awareness about the environment and the interaction of various components.
2. To understand about various ecosystems
3. To make an awareness about various effects of pollution and its management.
4. To create an awareness about the biodiversity and need for its conservation.

Unit 1 : Introduction to Environment

Components of environment –atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance

Ecosystem- Structure and function of ecosystem; Energy flow in an ecosystem; food chain, food web and ecological succession; Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems

Unit 2 : Natural Resources: Renewable and Non-renewable Resources

Land Resources- Land degradation, soil erosion and desertification.

Forest resources- Deforestation: Causes and impacts due to mining, dam building on environment,

Water resources: Use and over-exploitation of surface and ground water, floods, draughts,

Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources

Unit 3 : Biodiversity and Conservation

Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India, hotspots

India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Ecosystem and biodiversity services, Ecological, economic, social, ethical, aesthetic and Informational value,

Unit 4 : Environmental Pollution

Environmental pollution : types, causes, effects and controls: Air, water, soil, chemical and noise pollution

Nuclear hazards and human health risks

Solid waste management: Control measures of urban and industrial waste.

Unit 5 : Environmental Policies & Human Communities

Environment Laws - Environment Protection Act, Air (Prevention & Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act
Disaster management: Landslides, earthquakes, cyclones and hausholder
Environmental movements, Chipko, Silent valley

Books for Study:

1. Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders
2. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
3. Vijay Kumar Tiwari. 2017. *A Text Book of Environmental Studies*. Himalaya Publishing House.

Books for Reference:

1. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
- Gadgil, M., & Guha, R. 1993. *This Fractured Land: An Ecological History of India*. Univ. of California Press.
1. Gleeson, B. and Lew, N. (eds.) 1999. *Global Ethics and Environment*. London: Routledge.
2. Giejek, P.H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford Univ. Press.
3. Groom, Martha J. Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
4. Rao, M.N. & Dutta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
5. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment*. 8th edition. John Wiley & Sons.
6. Rosenzanz, A., Divan, S., & Noble, M.L. 2001. *Environmental law and policy in India*. Tripathi 1992.
7. Sengupta, R. 2003. *Ecology and economics. An approach to sustainable development*. OUP.
8. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology: Voices from the Tropics*. John Wiley & Sons.
9. www.naewc.riic.in
10. www.epsw.org

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VALUE BASED EDUCATION

(For the students admitted from the year 2019-20)

HOURS PER WEEK: 2

SEMESTER: 10

CREDITS: 3

SUBJECT CODE: 19VBC

UNIT I

Value Education - Introduction - relevance to present day - concept of human values - personal values - the qualities of humanity to be followed by an individual - self introspection - self-esteem.

அறிமுகம் - மதிப்புகளின் விளக்கம் - இன்றைய காலத்தில் மதிப்புகளின் மனித நேயத்தில் கருத்துகள் (அல்லது) மனித மதிப்புகள் - தனிமனிதன் பின்பற்ற வேண்டிய மனித நேயப் பண்புகள் - சுய சேதனை - சுய மரியாதை

UNIT II

Family values - dependent - responsibility of the family - neutralization of anger - adjustability - threats of family life - status of women in family and society - the problems of day to day life faced by Indian women - caring for needy and elderly - free time allotment for sharing ideas and concerns.

குடும்பமும் குடும்பம் சார்ந்த மதிப்புகளும் - சார்ந்திருத்தல் - குடும்பத்தின் பொறுப்புகள் - கோபத்தைத் தணிப்பது - அனுசரித்துச் செல்வது - குடும்பத்திற்கு ஏற்படும் அபாயங்கள் - அபாயங்களைப் போக்குவதற்கான வழிகள் - குடும்பத்திலும் சமுதாயத்திலும் பெண்களின் நிலை - தினசரி வாழ்க்கையில் இந்தியப் பெண்கள் சந்திக்கும் பிரச்சனைகள் - முதியோர் மற்றும் இயலாதோர் பாலுதார்ப்பும் பரிமாற்றும் - கருத்துப் பரிமாற்றத்திற்கு நேரம் ஒதுக்கீடு.

UNIT III

Ethical values - professional ethics - mass media ethics - advertisement ethics - influence of ethics on family life - psychology of children and youth.

Social values - faith, service and secularism - social sense and commitment - students and politics.

நெறிமுறைகள் - தொழில் நெறிமுறைகள் - மக்கள் தொடர்பு சாதனங்களின் நெறிமுறைகள் - விளம்பர நெறிமுறைகள் - நெறிமுறைகளும் குடும்பங்களும் - குழந்தைகள், இளைஞர்கள் இவர்களின் உளவியல்.

சமுதாய மதிப்புகள் - சமய சார்பற்ற நம்பிக்கை, சேவை, மதச்சார்பின்மை - சமூக சிந்தனைகளும், உடனடிக்காலம் - மாணவர்களும் அரசியலும்.

UNIT IV

Consumer's awareness, rights, responsibilities. Global issues - effect of international affairs on values of life - issues of globalization - modernization and terrorism - mutual respect for different cultures, religion and their values.

நுகர்வோர் விழிப்புணர்ச்சி, உரிமைகள், பொறுப்புகள் - உலகளாவிய பிரச்சனைகள் - உலகளாவிய விவகாரங்களின் மூலம் உருவாகும் மதிப்புகள் - தற்கால உலகளாவிய சமூகத்தின் தகவல்கள் - சமூகத்தின் மதிப்புகள் - மத, மொழி, சமூக, மரபுகளின் மீதுள்ள மதிப்புகள்.

BOOK FOR STUDY

மதிப்புக் கல்வி

K.R. கண்ணன்நாயடிகள்

1. உ. மார்பிகளின்

நெய்யாலைப் பதிப்பகம்.

69, பி.பி.என். 7 கதவுகள் ஏ1

37 அருகே தெருவின் கிழக்கில்.

சென்னை - 600 061.

BOOK FOR REFERENCE

Value Education

Prof. N.S. Raghunathan M.A., M.Phil.

MARGHAM PUBLICATIONS.

T NAGAR, CHENNAI - 17.

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SKILL BASED ELECTIVE - III

COMPUTING SKILLS-BASIC

(For the students admitted from the year 2019-20)

HOURS PER WEEK : 2

CREDITS : 2

SEMESTER : III

SUBJECT CODE : 19523

UNIT I

Introduction to computers - characteristic of computers - computer generation - basic computer organization.

UNIT II

Processor and memory: Central Processing Unit - control unit - Arithmetic and Logic Unit (ALU) - instruction set - registers.

Main memory: main memory organization - RAM, ROM, PROM & EPROM.

UNIT III

Word processing: Creating a word document - saving word document - applying basic formatting - applying bulleted and numbers lists - using Find, Replace, Spell checker, Headers and Footers.

UNIT IV

Spreadsheets: Creating a new excel work book - saving excel work book - adding data to cells - insertion and deletion of cells - working with tables and charts - formulas and functions.

References:

- Computer fundamentals, 4th edition, Pradeep, K. Singh and Priti Sanha, BPB publications.
- Microsoft 2003, Jennifer Ackerman Kertell, Guy Hat, Davis Curt Simmons, Tata McGraw Hill.

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SKILL BASED ELECTIVE - PERSONALITY DEVELOPMENT

(For the students admitted from the year 2019-2020)

HOURS/WEEK : 2

CREDITS : 4

SEMESTER : IV

SUBJECT CODE: 19S211

OBJECTIVES:

To provide the strategy for the growth of an individual. To create an awareness of interpersonal relations. To familiarize with the knowledge regarding the various causes of stress, types of stresses and various stress management strategies.

UNIT-1: Introduction to Personality Development:

Meaning of personality - Components of personality - Determinants of personality - Personality type - Role of personality development - Features of personality development - Need or Skills for personality development - Ways to develop personality - Tips to improve personality and Lifestyle.

UNIT-2: Self Awareness and Self Motivation:

Components of Self Awareness - Importance of Self Awareness-Developing Self Awareness - Self Motivation in life - Self Motivation techniques - Steps for Self Motivation- Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem.

UNIT-3: Interpersonal Relationships and Stress Management:

Interpersonal Relationships - Defining the difference between aggressive, submissive and assertive behaviours - Lateral thinking - Table Manners - Table Etiquettes in Multicultural Environment- Do's and Don'ts of Table Etiquettes - Stress Management - Meaning - Sources of Stress - Symptoms of Stress - Consequences of Stress - Managing Stress.

UNIT -4: Time Management, Leadership and Decision Making:

Planning & Goal Setting - Dealing with other people - Analysis of goals and objectives - Systemization of processes - Prioritization- Leadership and qualities of a successful leader - Decision making steps for making an effective decision - Guideline to problem solving and decision making.

UNIT -5: Communication and Group Discussion:

Communication - Definition - Importance of communication - Process of communication - Communication Symbols - Communication network - Barriers in communication - Overcoming Communication Barriers - Group Discussion - Meaning - Personality traits required for Group Discussion- Process of Group Discussion.

BOOKS FOR STUDY:

1. Dr.K.R.Dhanalakshmi & Prof.N.S.Raghnathan, Personality Enrichment, Margham Publications, 2017.
2. Stephan P.Robbins, Organisational Behaviour, Tenth Edition, Prentice Hall of India Private Limited, New Delhi,2008.
3. Hurlock, E.B , Personality Development, 28th Reprint, New Delhi: Tata McGraw Hill, 2006.
4. Hellen, Robert., Effective leadership Essential Manager series, Dk Publishing, 2002.