



C. ABDUL HAKEEM COLLEGE [AUTONOMOUS] MELVISHARAM
BACHELOR OF SCIENCE - DEGREE COURSE
UNDER CBCS PATTERN
[With effect from batch 2018-2019 ONWARDS]

B.Sc Mathematics

The Course of Study and the Scheme of Examinations

Year/ Semester	Part	Type	Subject Code	Subject Name	Ins. hrs./ week	Credits	CIA	Uni. Exam	Total Marks
I Year I Semester	I	Language	U18FTA101	Tamil - I	6	4	25	75	100
	I	Language	U18FUR101	Urdu - I	6	4	25	75	100
	II	English	U18FEN101	English - I	6	4	25	75	100
	III	Main	U18MMA101	Algebra & Trigonometry - I	5	3	25	75	100
	III	Main	U18MMA102	Differential Calculus & 3-D Geometry	4	3	25	75	100
	III	Allied	U18APH101	(to choose any 1 out of 3) A. Physics B. Chemistry C. Numerical Methods	4	4	25	75	100
	III	Allied (Practical)	U18APHP11	Allied Practical	3	0	0	0	0
	IV	Environmental Studies	U18CES101	Environmental Studies	2	2	25	75	100
I Year II Semester	I	Language	U18FTA201	Tamil - II	6	4	25	75	100
	I	Language	U18FUR201	Urdu - II	6	4	25	75	100
	II	English	U18FEN201	English - II	4	4	25	75	100
	III	Main	U18MMA201	Algebra & Trigonometry - II	4	3	25	75	100
	III	Main	U18MMA202	Integral Calculus & 3-D Geometry	4	3	25	75	100
	III	Main(Practical)	U18MMAP21	Practical - Computational Techniques - I	1	1	25	75	100
	III	Allied	U18APH201	(to choose any 1 out of 3) A. Physics B. Chemistry C. Numerical Methods	4	4	25	75	100
	III	Allied	U18APHP21	Allied Practical	3	2	25	75	100
	IV	Value Education	U18CVE201	Value Education	2	2	25	75	100
	IV	Soft Skills	U18CSS201	Soft Skills	2	1	25	75	100

II Year III Semester	I	Language	U18FUR301	Urdu - III	6	4	25	75	100
	I	Language	U18FTA301	Tamil - III	6	4	25	75	100
	II	English	U18FEN301	English - III	6	4	25	75	100
	III	Main	U18MMA301	Differential Equations	4	4	25	75	100
	III	Main(Practical)	U18MMAP31	Practical - II Computational Techniques - II	2	1	25	75	100
	III	Allied	U18ACH301	(to choose any 1 out of 3) A. Physics B. Chemistry C. Numerical Methods	4	4	25	75	100
	III	Allied (Practical)	U18ACHP31	Allied Practical	3	0	0	0	0
	IV	Skill Based	U18SMA301	Mathematics for Competetive Examinations (SBS - I)	3	3	25	75	100
	IV	Non Major	U18NUR301	Functional Urdu - I (NME - I)	2	2	25	75	100
	IV	Non Major	U18NTA301	Basic Tamil - I (NME - I)	2	2	25	75	100
	IV	Non Major	U18NHS301	Indian National Movement (NME - I)	2	2	25	75	100
	IV	Non Major	U18NCM301	Elements of Accountancy (NME - I)	2	2	25	75	100
II Year IV Semester	I	Language	U18FUR401	Urdu - IV	6	4	25	75	100
	I	Language	U18FTA401	Tamil - IV	6	4	25	75	100
	II	English	U18FEN401	English - IV	6	4	25	75	100
	III	Main	U18MMA401	Vector Analysis and Fourier Analysis	4	4	25	75	100
	III	Main(Practical)	U18MMAP41	Practical - III - Problem Solving Techniques using Geogebra and Matlab	2	1	25	75	100
	III	Allied	U18ACH401	(to choose any 1 out of 3) A. Physics B. Chemistry C. Numerical Methods	4	4	25	75	100
	IV	Skill Based	U18SMA401	Linear Programming (SBS - II)	3	3	25	75	100
	III	Allied(Practical)	U18ACHP41	Allied Practical	3	2	25	75	100
	IV	Non Major	U18NUR401	Functional Urdu - II (NME - II)	2	2	25	75	100
	IV	Non Major	U18NTA401	Basic Tamil - II (NME - II)	2	2	25	75	100
	IV	Non Major	U18NHS401	Civil Services and Other Competitive Examinations (NME - II)	2	2	25	75	100
	IV	Non Major	U18NKS401	Project Management (NME - II)	2	2	25	75	100
	IV	Non Major	U18NCH401	Chemistry in Every Day Life (NME - II)	2	2	25	75	100
	IV	Non Major	U18NZL401	Sericulture (NME - II)	2	2	25	75	100
	IV	Non Major	U18NCM401	General Commercial Knowledge (NME - II)	2	2	25	75	100

III Year V Semester	III	Main	U18MMA501	Abstract Algebra	5	4	25	75	100
	III	Main	U18MMA502	Real Analysis - I	6	4	25	75	100
	III	Main	U18MMA503	Complex Analysis	5	5	25	75	100
	III	Main	U18MMA504	MATHEMATICAL STATISTICS	4	3	25	75	100
	III	Main(Practical)	U18MMA501	PRACTICAL - MATHEMATICAL STATISTICS	2	2	25	75	100
	III	Elective	U18EMA501	(to choose any 1 out of 2) A. Graph Theory B. Operations Research	5	3	25	75	100
	IV	Skill Based	U18SMA501	Quantitative Techniques (SBS - III)	3	3	25	75	100
III Year VI Semester	III	Main	U18MMA601	Linear Algebra	5	4	25	75	100
	III	Main	U18MMA602	Real Analysis - II	6	5	25	75	100
	III	Main	U18MMA603	MECHANICS	6	4	25	75	100
	III	Main	U18MMA604	Programming in C Language	3	3	25	75	100
	III	Main(Practical)	U18MMA601	Practical in C Language	3	2	25	75	100
	III	Elective	U18EMA601	(to choose any 1 out of 2) A. Calculus of Finite Differences and Numerical Methods B. Special Functions	4	4	25	75	100
	IV	Skill Based	U18SMA601	Fundamentals of Applied Mathematics (SBS - IV)	3	3	25	75	100
	V	Extension Activities	U18CEA601	Extension Activities	0	1	0	50	50

CORE PAPER – 5

DIFFERENTIAL EQUATIONS

Objectives: To study logical skills in the formation of differential equations, to expose to different techniques of finding solutions to these equations and in addition stress is laid on the application of these equations in geometrical and physical problems.

Course Outcomes: At the end of the Course, the Students will able to	
CO1	Solve Bernoulli Equation, Exact Differential Equations , Equations of First order and Higher degree and Clairaut's Equation.
CO2	Solve ODE's using method of variation of parameters, Cauchy and Legendre's Linear Equations.
CO3	Solve Equations of form $d^2y/dx^2 = f(x)$, $d^2y/dx^2=f(y)$ etc., and Total Differential Equations.
CO4	Understand Laplace Transforms, Inverse Transforms, Properties and its application to linear Differential equations.
CO5	Understand the formation of PDEs, Solution of linear PDEs, PDEs of four standard types.

UNIT-I: Ordinary Linear Differential Equations

Bernoulli Equation – Exact Differential Equations – Equations Reducible to Exact Equations – Equations of First order and Higher degree: Equations solvable for p, Equation solvable for x and Equations Solvable for y – Clairaut's Equation.

Chapter 11: 11.10 to 11.14.

UNIT-II: Ordinary Linear Differential Equations [Contd...]

Method of Variation of Parameters – Method of Undetermined Coefficients – Equations reducible to Linear equations with constant coefficients – Cauchy's homogeneous Linear Equations – Legendre's Linear Equations.

Chapter 13: 13.8, 13.9(Full)

UNIT-III: Differential Equations of Other Types

Equations of form $d^2y/dx^2 = f(x)$ – Equations of the form $d^2y/dx^2 = f(y)$ – Equations which do not contain y – Equations which do not contain x – Total Differential Equations – Equations of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ – Method of Grouping and method of multipliers.

Chapter 15: 15.2 to 15.5, 15.8 and 15.10 (Omit 15.9).

UNIT-IV: Laplace Transform

Transform-Inverse Transform – Properties – Application of Laplace Transform to solution of first and second order Linear Differential equations [with constant coefficients] and simultaneous Linear Differential Equations.

Chapter: 7(Full)

UNIT-V: Partial Differential Equations

Formation of PDE — Solutions of a PDE - Equations Solvable by direct Integration – Linear Equations of the first order – Non-linear Equations of the first Order:

Types: $f(p, q) = 0$, $f(z, p, q) = 0$, $f(x, q) = f(y, p)$, $z = px + qy + f(p, q)$.

Chapter 17: 17.2 to 17.6

Recommended Books:

For Units 1,2,3 and 5, Refer:

B.S.Grewal [2002] Higher Engineering Mathematics, Khanna Publishers, New Delhi.

For Unit 4, Refer:

P.R.Vittal [2006] Differential Equations, Fourier and Laplace Transforms, Probability, Margham Publications, Chennai-17.

Reference Books:

1. Sheply L.Ross, [1984] Differential Equations, III Edition John Wiley & Sons, New York.
2. M.D. Raishighania, [2001] Ordinary and Partial Differential Equations, S.Chand and Co., New Delhi.
3. P.Kandasamy, K.Thilagarathy [2004] Mathematics for B.Sc. Vol. III S.Chand & Co., Ltd., New Delhi-55.

4. S.Narayanan & T.K.Manicavachagom Pillay [2004] Calculus S.Viswanathan printers & Publishers Pvt. Ltd., Chennai.

CORE PRACTICAL-II

COMPUTATIONAL TECHNIQUES – II

Objectives: This course aims to Solve Problems in Algebra and Calculus by using Matlab Software.

List of Exercises:

1. Maxima and minima
2. Basic arithmetic
3. Matrices
4. Solution to non-homogeneous linear equations using matrices
5. Symbolic integration

REFERENCES:

MATLAB MANUAL

SKILL BASED SUBJECT
PAPER - 1
MATHEMATICS FOR COMPETITIVE EXAMINATIONS

Objectives: This course aims to prepare the students for all competitive examinations.

Course Outcomes: At the end of the Course, the Students will able to	
CO1	Solve the problems on general arithmetic.
CO2	Understand the percentages& partnership problems.
CO3	Solve the problems on time & distance and time &work.
CO4	Solve the problems on commercial arithmetic.
CO5	Understand the properties of mean, mode, median, G.M &H.M, error corrections with problems.

UNIT-I: Problems on General Arithmetic

Ratio and proportions - Inverse ratio - properties (Addendo, subtrahendo, componendo & dividendo) - ratio of four numbers - increasing and decreasing order of fractions – Problems on ages.

UNIT-II: Percentages and Partnership

Percentages - gain and loss percents - Partnership problems.

UNIT-III: Time, Distance and Work

Time and distance- Time and work.

UNIT-IV: Commercial Arithmetic

Simple interest - Compound interest - Stocks and Shares.

UNIT-V: Basic Statistics

Measures of central tendencies, mean, median, mode, G.M & H.M, error correction, Applications and properties. Measures of dispersion - Range, M.D., S.D., Q.D, C.V.

Recommended Books:**Units I to IV Refer:**

Quantitative Aptitude - R.S. Aggarwal (S.Chand & Co - New Delhi 2008).

Unit V Refer:

Mathematical Statistics – P.R.Vittal, Margham Publications, Chennai-17,
Edition 2013.

Reference Books:

1. Course in Mental Abilities and Quantitative Aptitude for Competitive Examinations - Edgar Thorpe (Tata McGraw - Hill Pub., Co., Ltd. New Delhi - II Edn.,).
2. Statistics, RSN Pillai and A. Bagavathi, S.Chand & Co.,

NON-MAJOR ELECTIVE
PAPER -1
BASIC MATHEMATICS

Objectives: This Course aims to study about the basic elementary concepts of Mathematics for Non-Major Students.

Course Outcomes: At the end of the course, the students will able to	
CO1	Understand the concepts of Set theory.
CO2	Understand the number system.
CO3	Understand the logic concepts.
CO4	Understand the elementary concepts of Matrices.
CO5	Find the determinant of Matrices.

UNIT-I: Sets

Definition - Subsets - Power sets - Equality of sets - Finite and Infinite sets - Set operations - De-Morgan's laws - Distributive tables - Cartesian products.

UNIT-II: Number system

Binary, Octal, Hexadecimal numbers - conversion from one system to another system - addition and subtraction - one's complement.

UNIT-III: Symbolic logics

Logical statements - connectives - truth tables - tautologies operations - groups – (problems and simple properties only).

UNIT-IV: Matrices

Definition - types of matrices - operations on matrices - adjoint and inverse - applications - solving non-homogeneous equations.

UNIT-V: Determinants

Definition - properties (without proof) - application of determinants - Cramer's rule for the solution of a system of equations.

Reference Books

1. Dr.M.K.Venkataraman & others, “Discrete mathematics and structures”, The National Publishing Company, Madras.
2. Trembly J.P and Manohar.R “Discrete Mathematical Structures with applications to computer science” Tata McGraw - Hill Pub., Co., Ltd. New Delhi 2003.
3. Richard Johnsonbaugh, “Discrete Mathematics” fifth Edn., Pearson Education Asia, New Delhi 2002.
4. V.Vijayendran “Digital Fundamentals” S.Viswanathan Printers & Publishers Pvt. Ltd.
5. T.K.Manicavachagom Pillay & Others, “Algebra”, Volume II, S.Viswanathan Printers & Publishers Pvt. Ltd.

CORE PAPER – 6

VECTOR ANALYSIS AND FOURIER ANALYSIS

Objectives: This course aims to study about the vector calculus which is essential tools of modern applied mathematics. To develop deep understanding of key concepts followed by problems of applied nature. The portion on Fourier analysis will lead to post-graduate studies in pure as well as applied mathematics.

Course Outcomes: At the end of the Course, the Students will able to	
CO1	Understand the concepts of Vector differentiation.
CO2	Understand the concepts of Line integral, Surface integral and Volume integral.
CO3	Solve the problems using Gauss Divergence theorem, Stoke's theorem and Green's theorem.
CO4	Expand the functions as Fourier series for various intervals.
CO5	Understand the concepts of Fourier transform pair.

UNIT-I: Vector Differentiation

Vector Differential Operator ∇ - Gradient of a Scalar Function - Directional Derivative - Geometric Interpretation – Gradient of: the sum of Functions, the product of functions and a function of function - Operations involving ∇ - Divergence of a Vector and its Physical Interpretation - Curl of a Vector and its Physical Interpretation - Expansion Formulae for Operators involving ∇ - Solenoidal and Irrotational.

Chapter 1

UNIT-II: Vector Integration

The Line Integral - Surface and Volume Integral.

Chapter 2

UNIT-III: Vector Integration:(Continuation)

Statements of Gauss Divergence Theorem, Stoke's and Green's Theorems (without proof) and Problems.

Chapter 2

UNIT-IV: Fourier Series

Euler's Formulae - Conditions for Fourier Expansion - Functions having points of Discontinuity- Odd and Even Functions - Expansions of Odd or Even periodic Functions - Half-range Series - Parseval's Formula.

Chapter 10: 10.2 to 10.4, 10.6, 10.7 and 10.9 (only Parseval's Formula)

UNIT-V: Fourier Transform

Definition - Fourier Transform: Fourier Sine and Cosine Transforms – Finite Fourier Transform - Properties of Fourier Transforms - Convolution Theorem for Fourier Transforms - Parseval's Identity for Fourier Transforms (without derivation).

Chapter 22: 22.2, 22.4 to 22.7.

Recommended Books:

For Units 1, 2 and 3 Refer:

P.R.Vittal. (2004) Vector Calculus, Fourier series and Fourier Transform.
Margham Publications, Chennai.

For Units 4 and 5 Refer:

B.S.Grewal [2002] Higher Engineering Mathematics, Khanna Publishers, New Delhi.

Reference Books :

M.K.Venkataraman. (1992) Engineering Mathematics-Part B. National Publishing Company, Chennai.

CORE PRACTICAL-III

PRACTICAL - PROBLEM SOLVING TECHNIQUES USING GEOGEBRA AND MATLAB

Objectives: This course aims to Solve Analytical Problems in Graphical by using Geogebra Software and to Solve Problems in Calculus and Differential Equations by using Matlab Software.

GEOGEBRA:

1. Draw a circle
 - a) Using centre and radius.
 - b) Using centre passing through a point.
 - c) Passing through three points.
2. Draw a line
 - a) Passing through two given points.
 - b) Given one point and slope.
 - c) Perpendicular Line.
 - d) Parallel Line.
3. Draw a Vector
 - a) Between two points.
 - b) From a point and Parallel to a Vector.
4. Draw a Tangent
 - a) To the circle from outside point.
 - b) To the circle from a point on the circle.
5. Draw a Parabola.
6. Draw an Ellipse.
7. Draw a Hyperbola.

MATLAB:

1. Solving ordinary differential equation of first order.
2. Solving ordinary differential equation of second order.
3. Application of multiple integrals to find area and volume.

REFERENCES:

1. GEOGEBRA MANUAL
2. MATLAB MANUAL

SKILL BASED SUBJECT
PAPER – 2
LINEAR PROGRAMMING

Objectives: This course aims to study about linear programming problem and simulation by using various techniques.

Course Outcomes: At the end of the Course, the Students will able to	
CO1	Understand the basic concept of linear programming problems.
CO2	Understand the transportation problems.
CO3	Understand the Assignment problems.
CO4	Understand the concepts of game theory.
CO5	Understand the concepts of simulation.

UNIT-I

Linear programming problem - Mathematical formulation of the problem - Graphical solution method - Simplex method - Duality - primal and dual relation (Simple Problems).

UNIT-II

Transportation problem - Degeneracy in transportation problem.

UNIT-III

The Assignment problem – Travelling Salesman method.

UNIT-IV

Game theory - two persons zero sum game - the maximin and minimax principles - saddle points - games without saddle points.

UNIT-V

Simulation - application - advantages and disadvantages - Monte Carlo method - simple problems.

Recommended Text

Gupta P.K.and Hira D.S., (2000) Problems in Operations Research, S.Chand & Co. Delhi.

Reference Books

1. Kanti Swarup, Gupta P.K. and Man mohan, (2002) Problems in Operation Research, Sultan Chand & Sons.
2. V.K.Kapoor [1989] Operations Research, Sultan Chand & sons.
3. P.R.Vittal (2003) Operations Research, Margham Publications, Chennai.
4. J.K.Sharma, (2001) Operations Research: Theory And Applications Macmillan, Delhi.
5. S.J.Venkatesan, Operations Research, J.S. Publishes, Cheyyar-604407.

NON-MAJOR ELECTIVE
PAPER -2
FOUNDATION MATHEMATICS FOR COMPETITIVE
EXAMINATIONS

Objectives: This Course aims to prepare the students for various competitive examinations.

Course Outcomes: At the end of the course, the students will able to	
CO1	Understand the concepts of Ratio and Proportion.
CO2	Understand the concepts of Percentages.
CO3	Solve the problems on profit and loss.
CO4	Understand simple interest and compound interest.
CO5	Solve the problems on time & work and time & distance.

UNIT-I

Ratio and proportions.

UNIT-II

Percentages.

UNIT-III

Profit and loss, discounts.

UNIT-IV

Simple and compound interest.

UNIT-V

Time, Distance and Work.

Reference Book

1. Quantitative Aptitude - R.S. Aggarwal (S.Chand & Co. - New Delhi 2008).
2. Course in Mental Abilities and Quantitative Aptitude for Competitive Examinations - Edgar Thorpe (Tata McGraw - Hill Pub., Co., Ltd. New Delhi – II Edn.,).