UNDER-GRADUATE PROGRAMME

IN

MATHEMATICS

Courses of study, Schemes of examinations

& Syllabi

Applicable to candidates admitted from the
academic year 2018-2019 onwards

PG & RESEARCH DEPARTMENT OF MATHEMATICS
PERIYAR E.V.R. COLLEGE (AUTONOMOUS)
(Nationally Reaccredited at A level by NAAC)
TIRUCHIRAPPALLI – 620 023.

(For the candidates admitted from the academic year 2018 onwards)

CORE I : DIFFERENTIAL CALCULUS AND TRIGONOMETRY

Semester: I   **Subject Code:**

Hours   : 6   **Credits   : 6**

Objectives:

1. To introduce successive differentiation and partial differentiation
2.   To expose trigonometry as a tool in solving problem.

UNIT I: Successive differentiation - Proof of Leibnitz Theorem and its applications.

UNIT II: Curvature - Cartesian formula for the radius of curvature - Centre of curvature - Evolute and involute.

UNIT III: Expansions - Expansions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ - Expansion of $\sin^n\theta$, $\cos^n\theta$ -Expansion of $\cos\theta$, $\sin\theta$ and $\tan\theta$ in terms of θ.

UNIT IV: Hyperbolic functions - Relation between the circular and hyperbolic functions - inverse hyperbolic functions.

UNIT V: Logarithms of complex quantities – Summation of Trigonometric series - Method of differences - Series of n angles in Arithmetic Progression.

Text Books:

1."**Calculus" Volume I**, **S.Narayanan and T.K.Manicavachagom Pillay**, S.Viswanathan Reprint 2003

      UNIT I:Chapter 3 – Sections 1.1-1.6, 2.1-2.2

      UNIT II: Chapter 10– Sections 2.1-2.5

2."**Trigonometry", T.K.Manicavachagom Pillay, S.Narayanan and Ganapathy,** S.Viswanathan Reprint 2003

      UNIT III: Chapter 3 – Sections 1-5 (formation of equations excluded)

      UNIT IV: Chapter – Section 4

      UNIT V : Chapter 5 – Section 5 and Chapter 6 – Sections1 & 2

Reference Books:

1.S.Arumugam & others, Trigonometry, New Gamma Publications,1985 Revised Edition.

2.P.Duraipandian,Laxmi Duraipandian, Jayamala Paramasivam,Trigonometry, Emerald Publishers, Chennai, Reprint 1999.

(For the candidates admitted from the academic year 2018 onwards)

CORE II : ALGEBRA AND THEORY OF NUMBERS

Semester: II   **Subject Code:**
Hours   : 6   **Credits   :4**

Objectives:
1.   To study the theory of equations and numbers.
2.   To study the basic concepts and theorems in algebra.

UNIT I :   **Theory of Equations :** Transformation of equations – Reciprocal equations - standard problems.

UNIT II :   Diminishing and increasing roots of a given equation – Finding Quotient and Remainder – removal of terms – Formation of equations whose roots are any power of the roots of a given equation .

UNIT III: Descartes rule of signs-Horner's method of finding roots of a given equation correct to three decimal places.

UNIT IV: **Theory of numbers:** Prime, composite number – infinite sequence of primes – Decomposition of a composite number – Divisor of N – Euler's function $\phi(N)$ – Integral part of a real number – Highest power of a prime p contained in n!.

UNIT V :   Divisibility of the product of r consecutive integers by r! – Congruences - Fermat and Wilson's theorem – Lagrange's theorem.

Text Books
 1. **"Algebra" Volume – I by T.K.Manicavachagom Pillay, S. Natarajan and Ganapathy, 2013.**

   UNIT I: Chapter 6 – Sections 15 & 16

   UNIT II: Chapter 6 – Sections 17 to 20

   UNIT III: Chapter 6 – Section 24 & 30

2. "Algebra" Volume –II by T.K.Manicavachagom Pillay, S. Natarajan and Ganapathy, 2013.

   UNIT IV: Chapter 5 – Sections 1 - 10

   UNIT V: Chapter 5– Sections 11 – 12 & 16 – 18

Skill Based Elective - I: MATHEMATICS FOR COMPETITIVE EXAMINATIONS - I

Semester: I	**Subject Code:**
Hours : 2	**Credits : 2**

Objectives:

1. To provide a confidence to appear in competitive examinations for an executive posts.
2. To solve problems as quick as possible using short cut methods.

UNIT I   Numbers **-** H.C.F. and L.C.M of Numbers.

UNIT II   Decimal Fractions - Simplification .

UNIT III   Problems on Numbers - Problems on ages.

UNIT IV   Partnership – Time and Work.

UNIT V   Pipes and Cisterns– Time and Distance.

Text Book:
"Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal,
 S. Chand & Company Ltd., 7-th Edition,2015.

   UNIT I : Chapters 1, 2   Pages 1-45

   UNIT II: Chapters 3,4   Pages 46-116

   UNIT III : Chapters 7, 8   Pages 161-178, 182-189

   UNIT IV : Chapters 13,15   Pages 311-321, 341-364

   UNIT V : Chapters 16, 17 Pages 371-379, 384-401.

(For the candidates admitted from the academic year 2018 onwards)

CORE III : ANALYTICAL GEOMETRY OF THREE DIMENSIONS AND INTEGRAL CALCULUS

Semester: II   **Subject Code:**

Hours   : 6   **Credits   :6**

Objectives :
1. To study straight lines and spheres.
2. To learn the properties and applications of simple integrals and Beta and Gamma functions.

UNIT I:The Straight line : Symmetrical form of a straight line - Equation of a straight line passing through two given points – The condition for the lines to be parallel to the plane - Angle between the plane and the line – coplanar lines - Shortest distance between two given lines.

UNIT II: The Sphere : Equation of a sphere –Centre and radius of the sphere- Length of the tangent from the point to the sphere - The plane section of a sphere – Equation of a circle on a sphere –Intersection of two spheres – The equation of the tangent plane to the sphere.

UNIT III:Integral Calculus : Properties of definite integrals –Integration by parts – reduction formulae – Simple problems.

UNIT IV:Multiple Integrals: Double Integrals – Changing the order of integration - Triple Integrals - Change of Variables – Jacobian -Simple problems.

UNIT V:Beta and Gamma functions : Definition – Recurrence relation – Properties – Relation between Beta and Gamma functions– Simple problems.

Text Books:

1. "A Text Book of Analytical Geometry" Part II-Three Dimensions
   by T.K.Manicavachagom Pillay &T.Natarajan (Revised Edition 2013**)**
      UNIT I: Chapter III – Sections 1 to 8.
      UNIT II: Chapter IV – Sections 1 to 8.

2."Calculus" Volume II by S.Narayanan & T.K.Manicavachagom Pillay
   (Revised Edition 2013).
      UNIT III: Chapter 1 – Sections 11 & 12, 13.1 to 13.5 & 14.
      UNIT IV: Chapter 5 – Sections 2.1, 2.2, 4;
                  Chapter 6 – Sections 1.1, 1.2 and 2.1
      UNIT V: Chapter 7 – Sections 2.1 to 2.3, 3, 4, 5

(For the candidates admitted from the academic year 2018 onwards)

CORE – IV: SEQUENCES AND SERIES

Semester: III   **Subject Code:**
Hours   : 4   **Credits   : 4**

Objectives:
  To give the students a thorough knowledge of the various aspects of
  Convergence and Divergence of sequences and series.

UNIT I : Sets, Sequences – Aggregate-upper and lower bounds – Bounded
        sequences – Monotonic sequence.

UNIT II : Infinite series – Convergence of geometric series – Series of positive terms
        - Comparison tests - Cauchy's Condensation test - Simple problems.

UNIT III:D'Alembert's Ratio test - Cauchy's Root test - Raabe's test (only) - Simple
        problems using them – Absolutely Convergent series – Conditionally
        Convergent series - Alternating series and simple problems.

 UNIT IV: Binomial theorem for rational index(without proof) – Application of the
          Binomial theorem to the summation of series – Approximate values.

 UNIT V: The Exponential theorem (without proof) – Summation – The Logarithmic
        Series theorem (without proof) – Modification of the logarithmic series –
        Summation using different forms of the Logarithmic Series – Series which
        can be summed by the Logarithmic Series.

 Text Book:
"ALGEBRA, Volume – I" by **T.K.Manicavachagom Pillay,T.Natarajan and**
  K.S. Ganapathy. **S. Viswanathan, 2013**
      UNIT I: Chapter 2 – Sections 4 to 7
      UNIT II: Chapter 2 – Sections 8, 9, 12, 13, 14 and 15
      UNIT III: Chapter 2 – Sections 16.1, 16.2, 17, 19, 21 to 24
      UNIT IV: Chapter 3 – Sections 5, 10, 14
      UNIT V: Chapter 4 – Sections 2, 3, 5, 6, 7, 9

* 60% weightage should be given to theory and bookwork

(For the candidates admitted from the academic year 2018 onwards)

CORE V: VECTOR CALCULUS AND FOURIER SERIES

Semester: IV   **Subject code:**
Hours   : 6   **Credits   : 4**
Objectives:

      1. To study the relation between surface and Volume integrals.
      2. To represent periodic functions as Fourier series.

UNIT I : Gradient, Divergence and Curl.

UNIT II: Line integrals - Surface integrals.

UNIT III: Volume integrals - Green's theorem.

UNIT IV: Gauss's Divergence theorem - Stokes Theorem.

UNIT V : Fourier series: Fourier series for polynomial functions with period 2π - Half

      range cosine and sine series.

Text Books:

1. "Vector Calculus" by A.R. Vasishtha and A.K. Vasishtha, Krishna Prakasan
   Media(P) Ltd. 12-th edition, 2017

        UNIT I: Chapter 2 –Sections 2.1-2.11

        UNIT II: Chapter 3 –Sections 3.1-3.3

        UNIT III: Chapter 3–Sections 3.4 and Chapter 4, Sections 4.1-4.2

        UNIT IV: Chapter 4 –Sections 4.3-4.5

2. "Calculus'' (volume III) by T.K.Manicavachagom Pillay & S.Narayanan, 2008.

       UNIT V: Chapter 6– Sections 1 to 5.

Major Elective I: OPERATIONS RESEARCH – I

Semester: III   **Subject Code:**
Hours   : 4   **Credits   : 4**
Objectives:

1. To introduce the field of operations research which has many applications in management techniques.
2. To help students to find optimum solution in business and management problems.

UNIT I: Operations Research –An overview: Introduction **–** Origin and development of O.R. – Nature and features of O.R. – Applications of Operations Research - **Linear programming problem:** Introduction-Linear Programming Problem-Mathematical formulation - production allocation problem, product mix problem, product problem only- Graphical solution method –Some Exceptional Cases- General LPP - Canonical and Standard forms only.

UNIT II: Linear programming problem- Simplex Method : Introduction – The computational procedure –The Simplex Algorithm – Use of Artificial variables -Two Phase method –Big- M method.

UNIT III: Transportation problem: Introduction- LP Formulation of transportation problem –The Transportation Table – Solution of transportation problem – Finding an Initial Basic Feasible solution - Test for optimality - Degeneracy in transportation problem - Transportation Algorithm(MODI method).

UNIT IV: Assignment problem: Introduction - Mathematical formulation of the problem – Solution methods of Assignment problem - Special cases in Assignment problems: Maximization case only.

UNIT V: Network Scheduling by PERT/ CPM:- Introduction - Network :Basic components - Logical sequencing - Rules of Network constructions - Concurrent Activities - Critical path Analysis-Probability Considerations in PERT.

Text Book:

"Operations Research" by Kanti Swarup, P.K.Gupta and Man Mohan

Sultan Chand & Sons Educational Publishers, New Delhi, 16th Edition 2014.

       UNIT I : Chapter 1, 2 & 3 – Sections 1.1 to 1.3, 1.10, 2.1 to 2.4, 3.2 to 3.5
       UNIT II: Chapter 4 – Sections 4.1, 4.3, 4.4
       UNIT III: Chapter 10 – Sections 10.1,10.2,10.5,10.8,10.9,10.10,10.12,10.13
       UNIT IV: Chapter 11 – Sections 11.1 to 11.4
       UNIT V : Chapter 25 – Sections 25.1 to 25.7

Reference Book:

"Operations Research"by Hamdy A.Taha, Pearson publisher,9th edition,2012

Skill Based Elective –II : MATHEMATICS FOR COMPETITIVE EXAMINATION-II

Semester : III   **Subject Code :**
Hours   : 2   **Credits   : 2**

Objectives:

1. To provide a confidence to appear in competitive examinations
2. To solve problem in a fraction of minute using short cut methods.

UNIT I   **:** Problems on Trains - Boats & Streams.

UNIT II   **:** Alligation or Mixture – Races & Games of Skill

UNIT III   **:** Calendar - Clocks.

UNIT IV   **:** Stocks & Shares - Permutations & Combinations.

UNIT V   **:** Heights & Distances – Odd man out & Series.

Text Book:

**"Quantitative Aptitude For Competitive Examinations (Fully Solved)"by
  R.S. Aggarwal, S.Chand& Company PVT. LTD.,New Delhi, Reprint 2015**.

> **UNIT I**: Chapters 18, 19 – pages 405-416, 425-431
>
> **UNIT II**: Chapters 20, 26 – pages 435-444, 588-592
>
> **UNIT III**: Chapters 27, 28 – pages 593-596, 597-604
>
> **UNIT IV**: Chapters 29, 30 – pages 605-612, 613-620
>
> **UNIT V** : Chapters 34, 35 – pages 642-648, 649-657

CORE VI : DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

SEMESTER: IV　　　　　　　　　　　**SUBJECT CODE:**
HOURS　: 6　　　　　　　　　　　　　**CREDITS　: 6**

Objectives: The students are enabling to
1. understand various types of ordinary differential equations.
2. study partial differential equations.
3. know the introduction of Laplace Transform techniques to solve ODE's.

UNIT I: Second order Linear differential equations with constant coefficients – Particular integrals for e^{ax} , $\sin ax$, $\cos ax$, x^m and $e^{ax} f(x)$. Linear equations with variable coefficients.

UNIT II: Exact Differential Equations – Variation of parameters – Total differential equations.

UNIT III: Partial differential equations – Formation of P.D.E by elimination of arbitrary constants and arbitrary functions. – Definitions of general particular and complete integrals – Solution of first order equations of the form $F(p,q) = 0$, $F(x,p,q) = 0$, $F(y,p,q) = 0$, $F(z,p,q) = 0$, $F_1(x,p) = F_2(y,q)$ and $Z = px + qy + f(p,q)$ - Lagrange's method of solving $Pp + Qq = R$.

UNIT IV: The Laplace Transforms – Definitions - Results - Some general theorems – Problems using theorems.

UNITV: The Inverse Laplace Transforms – Results – Problems using results – Applications to solving ordinary differential equations using Laplace transforms technique.

Text Book :
"**CALCULUS**"- **VOLUME III(2013)by S.Narayanan & T.K.Manicavachagom Pillay.** (S. Viswanathan Printers &Publishers Pvt Ltd. 2013)

　　　UNIT I: Chapter 2 –Sections 1.1, 3, 4, 8.1 to 8.3

　　　UNIT II: Chapter 1 – Sections 3.1 to 3.3 & 4
　　　　　　Chapter 2 – Sections 10
　　　　　　Chapter 3 – Sections 7.1 to 7.4

　　　UNIT III: Chapter 4 – Sections 2.1, 2.2, 3, 5.1 to 5.4 & 6

　　　UNIT IV: Chapter 5 – Sections 1, 1.1, 1.2, 2, 4 & 5

　　　UNIT V : Chapter 5 – Sections 6,7,8

CORE VII – ALGEBRA

Semester: V   **Subject Code:**
 Hours   :6   **Credits   : 5**

Objectives: To enable the student to
   1.know the algebraic structures of Mathematics.
   2.learn about rings and vector spaces
   3.learn about inner product spaces and matrix of linear transformation

UNIT I:Groups: Definition and Examples – Elementary Properies of a group – Equivalent definition of a group – Permutation groups – Sub groups – Cyclic groups

UNIT II: Order of an Element – Cosets and Lagranges' theorem – Normal sub groups and Quotient groups – Isomorphism – Homomorphisms.

UNIT III: Rings: Definition and Examples – Elementary properties of rings – Types of rings – Isomorphism   characteristic of a ring – Sub rings – Ideals – Quotient rings

UNITIV: Vector Spaces: Definition and Examples – Subspaces – Linear Transformation – Span of a set – Linearly Independence – Basis and Dimension

UNIT V: Rank and Nullity – Matrix of a Linear Transformation – **Inner Product Spaces:** Definition and   Examples – Orthogonality – Orthogonal Complement.

Text Book:

'Modern Algebra' by Arumugam.S & Isaac.A.T(reprint, November 2015) SCITECH   Publications (India) Pvt Ltd

   UNIT I: Chapter 3 – Sections 3.1 to 3.6

   UNIT II: Chapter 3 – Sections 3.7 to 3.11

   UNIT III: Chapter 4 – Sections 4.1, 4.2 to 4.8.

   UNIT IV: Chapter 5 – Sections 5.1 to 5.6

   UNIT V: Chapter 5 – Sections 5.7 & 5.8

      Chapter 6 – Sections 6.1 to 6.3

  * **Emphasis should be given to theory**

CORE VIII: REAL ANALYSIS

Semester: V   **Subject Code:**
Hours   : 6   **Credits   : 4**

Objectives : To enable the students to
1. know about the real number system and its properties
2. study the properties of various functions defined on the real line
3. get the analytical skill about continuity and derivability.
4. learn about some standard theorems such Rolle's, Darboux's, Taylor's theorem etc.
5. get the insight knowledge of Riemann integration and fundamental theorems.

UNIT I:Real numbers – Field axioms – Order in R – Absolute value – completeness Some important subsets of R – Representation – Intervals – Countable and uncountable sets.

UNIT II :Continuous functions – Limits: one-sided limits – limit as x approaches c – Algebra of limits - Infinite limits, limits as $x \to +\infty \text{ or } -\infty$ and infinite limits as $x \to +\infty \text{ or } -\infty$ (Definitions only) - Continuous functions – Types of discontinuous – Algebra of continuous functions – Boundedness of Continuous functions - Uniform continuity.

UNIT III:Derivatives: Introduction – Derivability and continuity – Algebra of derivatives – Inverse function theorem for derivatives – Darboux's theorem on derivatives.

UNIT IV:Mean Value Theorems - Rolle's Theorem – Lagrange's mean value theorem - Cauchy's mean value theorem – Taylor's theorem –Taylor's series - Power series expansions of some standard functions (e^x, sin x, cos x, $(1 + x)^m$ and log $(1 + x)$ only).

UNIT V:Riemann integrability– Introduction – Riemann integrability - Darboux's theorem (statement only) – Another equivalent definition - Conditions for Integrability – Particular classes of bounded integrable functions – Properties of Integrable functions – Functions defined by definite integral – The first mean value theorem only.

Text Books:
1."A first course in Real Analysis" by M.K. Singal and Asha Rani Singal,
29th Edition, 2012, R.Chand & Company Ltd., New Delhi**.**
   UNIT I: Chapter 1– Sections 2,4,5,6,7,8,9& 10.
   UNIT II: Chapter 5 – Sections 1.1 to 1.3,1.4 to 1.6(definitions only),2 to 5, 8
   UNIT III: Chapter 6 – Sections 1 to 5
   UNIT IV: Chapter 7– Sections 1 to 6
2. " A course of Mathematical Analysis" by Shanthi Narayanan & P.K. Mittal,
2009, S.Chand & Company Ltd., New Delhi.
   UNIT V : Chapter 6 – Sections 6.1, 6.2, 6.3 (Darboux's theorem statement only), 6.4, 6.5, 6.6, 6.7, 6.8, 6.9.1

 * **Emphasis should be given to theory**

(For the candidates admitted from the academic year 2018 onwards)

CORE IX: STATICS

Semester: V   **Subject Code:**
Hours   : 6   **Credits   : 4**

Objectives: To enable the students to
1. learn various concepts in Statics and its applications
2. acquire and develop knowledge in applied mathematics
3. increase their capability to perform better in UGC, CSIR- NET and SLET Examinations.

UNIT I : Introductory ideas on forces – Forces acting at a point.

UNIT II: Parallel forces – Moment of a force about a point – Generalized theorem of Moments - Couples – simple problems.

UNIT III: Equilibrium of three forces acting on a rigid body – Coplanar forces – General conditions of equilibrium of a system of coplanar forces.

UNITIV: Friction – Laws of friction – Equilibrium of a particle on a rough inclined plane under a force parallel to the plane and under any forces – Problems on friction.

UNIT V: Equilibrium of Strings – Uniform strings under gravity – Common Catenary – The parabolic Catenary – Suspension Bridges - problems.

Text Book:
"STATICS" by Dr.M.K.Venkatraman, Sixteenth Edition, 2013, Agasthiar Publications.

UNIT I: Chapter 1– Sections 1 to 6; Chapter 2 Sections 1 to 16.

UNIT II: Chapter 3– Sections 1 to 13 and Chapter 4 Sections 1 to 10.

UNIT III:Chapter 5–Sections 1 to 6; Chapter 6 Sections 1 to 13,upto Page 178.

UNIT IV: Chapter 7 –Sections 1 to 13.

UNIT V: Chapter 11– Sections 1 to 9.

Reference Books:
1. "Statics" by K.ViswanathaNaik and M.S.Kasi
2. "Statics" by M.L.Khanna
3. "Statics" by Duraipandian

* **Preference should be given to bookwork**

(For the candidates admitted from the academic year 2018 onwards)

CORE X: OPERATIONS RESEARCH – II

Semester: V   **Subject Code:**
Hours   : 4   **Credits   : 4**

Objectives:
1. To introduce the various techniques of Operations Research.
2. To make students solve real time problems in Business and management.

UNIT – I : Sequencing Problem: Introduction –Problem of sequencing – Basic terms used in sequencing –Processing n jobs through two machines – Processing n jobs through k machines. **(Problems only)**

UNIT – II : Games and Strategies : Introduction –Two person zero sum games - Some basic terms - the maximin - minimax principle - Games without saddle points - Mixed strategies - graphic solution of 2 x n and m x 2 games – Dominance property. **(Problems only)**

UNIT- III : Replacement Problems : Introduction – Replacement policy when value of money does not change with time – Replacement policy when value of money changes with time – Replacement of equipment that fails suddenly - Group replacement policy. **(Problems only)**

UNIT IV : Inventory Control : Costs associated with inventories – Factors affecting inventory control - An inventory control problem – The concept of EOQ – Deterministic inventory with no shortages – Deterministic inventory problem with shortages – problems of EOQ with price breaks. **(Problems only)**

UNIT V : Queueing Theory – Elements of a queueing system – Classification of queueing models – Definition of transient and steady states – Poisson Queueing Systems – Model I { (M/M/1):(∞/FIFO)} – Model III {(M/M/1) : (N/FIFO)} – Model V {(M/M/C):($\infty/FIFO$)}. **(Problems only)**

Text Books:

1. **Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, 16th edition,**   Sultan Chand and Sons, Reprint 2014.

UNIT I :Chapter 12- sections 12.1 to 12.6 pp.327 – 342

UNIT II:Chapter 17- sections 17.1 to 17.7 pp.443 – 464

UNIT III:Chapter 18 – sections 18:1, 18:2-18:2.1,18:2.2,18:3 pp.478 – 492

UNIT IV:Chapter 19 – sections 19.6 to 19.12 pp. 510 – 538

UNIT V :Chapter 21 – sections 21:3, 21:7, 21:8, 21:9, pp.589,590,591,596 to 604, 608 to 610, 613to 618.

Major Elective II: C PROGRAMMING

Semester: V   **Subject Code:**
Hours: 4   **Credits   : 4**

Objectives:
1. To introduce the concepts of C language to the students.
2. To enable the students to write programmes for mathematical applications.

UNIT I: **Constants, Variables and Data types** - Character set – C tokens – Keywords and identifiers – Constants-Variables- Data types- Declaration of variables and storage class- Assigning   values   to variables **– Operators   and   Expressions** – Arithmetic Operators - Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operator – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Operators -**Managing   input   and   output operations** – Reading a character –   Writing a character –Formatted input – Formatted output.

UNIT II: **Decision making and branching** –Decision making with IF statement – simple IF   statement - The   IF   ELSE   statement – Nesting IF...ELSE statements – the ELSE IF ladder - The   switch   statement - The ?: operator – The   GOTO statement – **Decision making and looping** – The WHILE, DO,FOR statements.

UNIT III: **Arrays** – One dimensional arrays – Declaration and initialization of one dimensional arrays -   two   dimensional   arrays – initializing two dimensional arrays - multi dimensional arrays - **Character   arrays and strings** – Declaring and initializing string variables –   Reading   strings from   terminal – Writing   strings to   screen – Arithmetic operations on characters- Putting strings together – Comparison of two strings – String handling functions.

UNIT IV: **User defined functions** – Need for user defined functions – A multi-function program – Elements of user defined functions – Definitions 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- No arguments but returns a value – Functions that return multiple values – Nesting of functions – Recursion.

UNIT V: **File Management in C** – Defining and opening a file – Closing a file –Input / Output   operations on files – Error   handling during   I/O operations - Random access to files.

Text Book:
"Programming   in   ANSI   C"   (Sixth   edition)   by   E.Balagurusamy,   Tata McGraw Hill Publishing Company Limited, 2015.

UNIT I: Chapter 2 – Sections 2 to 10; Chapter 3 – Sections 2 to 12
       Chapter 4 – Sections 2 to 5.
UNIT II: Chapter 5 – Sections 2 to 9, Chapter 6 – Sections 2 to 4.
UNIT III: Chapter 7 – Sections 2 to 7,   Chapter 8 – Sections 2 to 8.
UNIT IV: Chapter 9 – Sections 2 to 16.
UNIT V: Chapter 12 – Sections 2 to 6.

(For the candidates admitted from the academic year 2018 onwards)

SSD – SOFT SKILLS DEVELOPEMENT

SEMESTER: V   **Subject Code:**
Hours: 2   **Credits   : 2**

Learning Objective

Today's world is all about relationship, communication and presenting onself, one's ideas and the company in the most positive and impactful way. This course intends to enable students to achieve excellence in both personal and professional life.

UNIT I: Know Thyself/Understanding Self: Introduction to Soft skills discovery- Developing positive attitude-Improving perceptions-Forming values.

UNIT II: Interpersonal Skills/Understanding Others: Developing interpersonal relationship-Team building-group dynamics-Net working improved work relationship.

UNIT III: Communication Skills/Communication with others: Art of listening – Art of reading –Art of speaking – Art of writing – Art of writing emails – email etiquette.

UNIT IV: Corporate Skills/Working with others: Developing body language – Practicing etiquette and mannerism – Time management – Stress management.

UNITV: Selling Self/Job Hunting: Writing resume/cv-interview skills – Group discussion – Mock interview – Mock GD – Goal setting – Career planning.

TEXT BOOKS:

1. "A Book on Development of Soft Skills (Soft Skills: A Road Map to Success)" by Meena.K and V.Ayothi(2013),P.R.Publishers & Distributors.

2. "Soft Skills – Know Yourself & Know the World", by **Alex K.(2012),** S.Chand & Company Ltd, New Delhi.

REFERENCE BOOKS:

(i)   Developing the leader within you John c Maxwell
(ii)   Good to Great by Jim Collins
(iii)   The seven habits of highly effective people Stephen Covey
(iv)   Emotional Intelligence Daniel Goleman
(v)   You can win Shiva Khera
(vi)   Principle centred leadership Stephen Covey.

CORE XI: COMPLEX ANALYSIS

SEMESTER: VI   **Subject Code:**
 Hours   : 6   **Credits   : 5**

Objectives: To enable the students to

1. analyze Analytic and Harmonic Functions.
2. understand Bilinear Transformations.
3. know the Complex Integration.

UNITI: Analytic Functions: Functions of a Complex Variable – Continuous Functions – Differentiability – The Cauchy-Riemann Equations – Analytic Functions – Harmonic Functions.

UNIT II: Bilinear Transformations: Bilinear Transformations – Cross Ratio – Fixed Points of Bilinear Transformations – Some Special Bilinear Transformations.

UNITIII: Complex Integration: Cauchy's Theorem – Cauchy's Integral Formula – Higher Derivatives.

UNITIV: Series Expansions: Taylor's Series – Laurent's Series – Zeroes of an Analytic Functions – Singularities.

UNITV: Calculus of Residues: Residues – Cauchy's Residue Theorem – Evaluation of Definite Integrals.

TEXT BOOK:
"Complex Analysis" by Dr. S. Arumugam, A. Thangapandi Isaac, & A. Somasundaram, Scitech Publications (India) Pvt. Ltd, New Delhi, 2014.

UNIT I :Chapter 2 – Sections 2.1 and 2.4 to 2.8

UNIT II: Chapter 3 – Sections 3.2 to 3.5

UNIT III :Chapter 6 – Sections 6.2 to 6.4

UNIT IV: Chapter 7 – Sections 7.1 to 7.4

UNIT V :Chapter 8 – Sections 8.1 to 8.3

* Emphasis should be given to theory

(For the candidates admitted from the academic year 2018 onwards)

CORE XIII: DYNAMICS

Semester: VI   **Subject Code:**

Hours   : 6   **Credits   : 6**

Objectives: To enable the students to

1. learn various concepts in dynamics and its applications.
2. acquire and develop knowledge in applied mathematics.

UNIT I: Kinematics : Speed, Displacement, Velocity – composition of velocities- Resolutions of velocities- Components of a velocities along two given directions- Angular Velocity, angular velocity of a particle moving along a circle with uniform speed - Angular velocity of a particle moving along any curve. Change of velocity- Acceleration – Variable acceleration- Motion of a particle in a Straight line under uniform acceleration – Acceleration of falling bodies - Vertical motion under gravity- Bodies freely falling downward.

UNIT II: Projectiles: Projections in vacuum-Characteristics of the motion of the projectile - Maximum height reached, Range, Time of flight – Velocity of projection - Range on an inclined plane.

UNIT III: Collision of Elastic Bodies: Conservation of linear momentum – Impact of a smooth sphere on a smooth fixed plane- Direct and oblique impact of two smooth Spheres – Loss of Kinetic energy due to direct and oblique impact of two smooth Spheres.

UNIT IV: Simple Harmonic Motion: Simple harmonic motion in a straight line – Motion of a particle suspended by a spiral spring - Simple Pendulum.

UNIT V: Motion under Action of Central Forces: Velocity & acceleration in polar – co-ordinates – Central forces - Differential equation to a central orbit – Perpendicular from the pole on the tangent- Pedal equation of the central orbit and for some well known curves–Velocities in central orbit - Given the orbit to find the law of force - Given the law of force to find the orbit.

Text Book:

"DYNAMICS" by **Dr.M. K. Venkatraman**, 16th Edition, 2014, Agasthiar Publications.
    UNIT I: Chapter 3– Sections 3.1 to 3.6, 3.11 to 3.13, 3.16 to 3.18,3.22
            and 3.29 to 3.31
    UNIT II: Chapter 6 – sections 6.1 to 6.5, 6.7 to 6.10 & 6.12
    UNIT III : Chapter 8 – sections 8.1 to 8.8
    UNIT IV : Chapter 10 – sections 10.1 to 10.4, 10.6, 10.7, 10.9 and 10.12 to10.15
    UNIT V : Chapter 11– sections 11.2, 11.5 to 11.13
Reference Book: **Dynamics** by **Duraipandian**.

* Preference should be given to theory

CORE XII: GRAPH THEORY

Semester :VI   **Subject code:**
Hours   :5   **Credits   : 4**

Objectives:
1. To understand various types and properties of graph.
2. To realize the physical situation in which graph theory can be applied.

UNIT I: Graphs and sub graphs: Graph – Application of graphs – Finite and Infinite graphs – Incidence and Degree - Isolated Vertex, Pendant Vertex and Null graph – Isomorphism – Subgraphs – Walks, Paths and Circuits – Connected graphs.

UNIT II: Euler and Hamiltonian graphs: Euler graphs – Operations on graphs – More on Euler graphs- Hamiltonian paths and circuits – The traveling salesman problem.

UNIT III: Trees: Trees – Some properties of trees – Pendant vertices in a tree – Distance and centers in a tree – Rooted and binary trees – Spanning trees – Fundamental circuits.

UNIT IV: Cut-sets and cut-vertices: Cut-sets – Some properties of cut-sets – All cut-sets in a graph – Fundamental circuits and cut-sets – Connectivity and separability – network flows.

UNIT V: Planar and Dual planar graphs: Planar graphs – Kuratowski's two graphs – Chromatic number – Chromatic partitioning – Chromatic polynomial.

Text Book:
'**Graph Theory with applications to engineering and computer science**'
 by NARSINGHDEO, PRENTICE HALL OF INDIA PRIVATE LIMITED, 2012.

UNIT I: Chapter 1– Sections 1.1 to 1.5

Chapter **2 –** Sections 2.1, 2.2, 2.4, 2.5

UNIT II: Chapter 2–Sections 2.6 to 2.10

UNIT III: Chapter 3 –Sections 3.1 to 3.5, 3.7, 3.8

UNIT IV: Chapter 4–Sections 4.1 to 4.6

UNIT V: Chapter 5– Sections 5.2, 5.3, 8.1 to 8.3

Reference Books:
1. '**Introduction to graph theory**' byArumugam. S. and Somasundaram. S.,

2. '**Graph theory**' by Harrary. F.,Narosa Publishing house, 1988.

CORE XIV: NUMERICAL METHODS

Semester: VI   **Subject Code:**
Hours   : 5   **Credits   : 4**

Objectives:
1. To introduce different numerical techniques to solve Algebraic and differential equations
2. To develop skills in solving problems using numerical techniques.

UNIT I : The solution of algebraic and transcendental equations –The Bisection method –   The Method of False position – The Iteration method – Newton-Raphson method.**(Problems only)**

UNIT II : Finite differences – Forward differences, backward differences – Newton's Formula for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula. **(Problems only)**

UNITIII: Numerical differentiation – Numerical Integration – Trapezoidal rule – Simpson's one third rule – Simpson's 3/8 rule. **(Problems only)**

UNIT IV: Numerical solution of Ordinary Differential Equations – solution by Taylor's series – Picard's method of successive approximations. **(Problems only)**

UNIT V: Euler method – Modified Euler method – Runge-Kutta method – Milne's Predictor-Corrector method. **(Problems only)**

Text Book:
"Introductory Methods of Numerical Analysis" by S.S.Sastry, Prentice Hall of India private limited, New Delhi 5th edition, 2013.

UNIT I: Chapter 2 – Sections 2.1 to 2.5

UNIT II: Chapter 3 – Sections 3.3, 3.3.1, 3.3.2, 3.6, 3.9, 3.9.1

UNIT III: Chapter 6 – Sections 6.2, 6.4

UNIT IV: Chapter 8 – Sections 8.2, 8.3

UNIT V: Chapter 8 – Sections 8.4, 8.4.2, 8.5, 8.6.2

Reference Books:
"Numerical Methods" by P.Kandasamy & K.Thilagavathy

(For the candidates admitted from academic year 2018 onwards**)**

Major Elective III : ASTRONOMY

Semester: VI   **Subject Code:**
Hours   : 5   **Credits   : 4**

Objective:
1. Astronomy is the science dealing with the study of heavenly bodies (Astronomical objects)
2. To study the characteristics of Moon, Stars and Eclipses.

UNIT I : Formula for spherical Trigonometry (all without proof) – Celestial Sphere – Diurnal motion.

UNIT II : Dip of Horizon – Twilight – Refraction - Astronomical refraction – Tangent and Cassini's   formula for   refraction.

UNITIII : Kepler's laws of planetary motion (statement only) –Newton's deductions from them –Three anomalies of the earth and relations between them.

UNIT IV : Time – Equation of time – Seasons.

UNIT V : Moon – Eclipses.

Text Book :

"**Astronomy" by Prof . Kumaravelu and Prof. Sushseela Kumaravelu .** (Revised and enlarged   edition   2013).

UNIT I : Chapter I –Sections: 21 – 23, 25 (all without proof) and
Chapter II –Sections: 39 - 63, 66-68 , 69 – 79 , 80 – 83.

UNIT II: Chapter III –Sections : 106 -116
Chapter IV –Sections : 117 – 133

UNIT III : Chapter VI– Sections :146, 153 (statement only) and 156 – 163.

UNIT IV : Chapter VII –Sections: 166 – 170 , 172 , 173

UNIT V : Chapter XII– Sections 229 -241
Chapter XIII –Sections 256 – 263, 267 – 270

Skill Based Elective III: MATHEMATICS FOR ECONOMICS

Semester: VI   **Subject Code:**
Hours   : 2   **Credits   : 2**

Objectives:
   1.To study various applications of differentiation and integration in economics.
   2.To bring certain situations into economic models.

UNIT   I:Application of differentiation in Economic theory: Elasticity of demand-Utility function – Production function – Cost function –Illustrative examples.

UNIT   II:Revenue: Revenue function – Marginal Revenue product , Marginal Physical Product and Marginal Revenue - Illustrative examples.

UNIT III:Application of   partial   derivatives   in   economics : Theory   of consumer behaviour - producer's   equilibrium, nature of commodities and   partial derivatives - Illustrative examples.

UNIT IV:Application of integration in economics : Consumer's   surplus – Producer's   surplus – A problem on durable capital goods - Illustrative examples.

UNIT V:Economic models : Model construction – Economic and Econometric models- Classical model- National income model.

Text Book:
"Mathematics for Economics" by D.R.Aggarwal,Vrinda Publications(P)Ltd.,2006.

   UNIT I: Chapter 11 – Pages 254 - 261, 266 – 273

   UNIT II: Chapter 11 – Pages 262 - 265, 274 - 284

   UNIT III: Chapter 14 – Pages 363 – 385.

   UNIT IV: Chapter 15 – Pages 437 – 459.

   UNIT V: Chapter 17 – Pages 537 – 543

FIRST ALLIED I : MATHEMATICS I
(For Physics and Chemistry Major)

Semester : I   **Subject Code :**
Hours   : 4   **Credits   : 4**
Objectives:

1. To introduce higher derivatives and to learn Leibnitz theorem and its applications.
2. To learn about vector differentiation, vector integration and applications.

UNIT I: Successive Differentiation – nth derivatives of standard functions – Leibnitz Theorem (Statement only) for nth derivative of a product of two functions – simple problems.

UNIT II: Cartesian formula for the radius of Curvature.

UNIT III: Properties of Definite Integrals – Integration by parts.

UNIT IV: Vector differentiation – Vector differential operator DEL, Gradient, Divergence and Curl – Formulae involving DEL once – simple problems.

UNIT V: Vector Integration – Line, Surface and Volume Integrals – simple problems.

Text Books:

1. **"Calculus" Vol I by T.K.Manicavachagom Pillay, and S.Narayanan, 2014**

    UNIT I :   Chapter 3 – Sections 1.1, 1.2, 1.3, 1.4, 1.6, 2.1

    UNIT II :   Chapter 10 – Section 2.3

2. **"Calculus" Vol II by T.K.Manicavachagom Pillay, and S.Narayanan , 2013**

    UNIT III: Chapter 1 – Sections 11, 12

3. **"Vector Calculus" by A.R.Vasishta and A.K.Vasishta, 2014**

    UNIT IV :   Chapter 2 – Sections 2.1 to 2.4, 2.8 to 2.10 .

    UNIT V :   Chapter 3 – Sections 3.1 to 3.4.

FIRST ALLIED I : MATHEMATICS II

(For Physics and Chemistry Major)

Semester: II   **Subject Code :**

Hours : 4   **Credits   : 2**

Objectives: To provide basic knowledge of series, matrices and Trigonometry.

UNIT I :   Application of the Binomial theorem to the summation of series..

UNIT II :   Summationof Exponential Series and Logarithmic Series.

UNIT III :   Matrices – Characteristic equation - Eigen values only - Statement of Cayley Hamilton theorem.- Application of Cayley Hamilton theorem

UNIT IV : Expansions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$

UNIT V :   Powers of sines and cosines of θ in   terms of functions of multiple of θ.

Text Books:

1. **"Algebra" Volume I by T.K.Manicavachagom Pillay, T.Natarajan and S.Ganapathy, 2016**

    UNIT I   :   Chapter 3 - Section 10

    UNIT II   :   Chapter 4 - Sections 3,5,7

2. **"Algebra" Volume II by T.K.Manicavachagom Pillay, T.Natarajan and S.Ganapathy, 2016**

    UNIT III :   Chapter 2 - Sections 16,16.3

3. **"Trigonometry" by T.K.Manicavachagom Pillay and S.Narayanan, 2015**

    UNIT IV : Chapter 3 - Sections 1,2

    UNIT V :   Chapter 3 - Sections 4,4.1,5,5.1

FIRST ALLIED I: MATHEMATICAL III
(for Physics and chemistry Majors)

Semester: II   **Subject Code:**

Hours   : 4   **Credits   : 4**

Objectives:

1. To expose differential equations as a powerful tool in solving problems
2. To introduce Laplace transform techniques to solve ODE's.
3. To understand the various statistical methods by giving real life examples.

UNIT I: Second order differential equations with constant coefficients – Particular integrals for e^{ax}, $\sin ax$, $\cos ax$, x^m.

UNIT II: Partial differential equations – Formation of Partial differential equations by elimination of arbitrary constants and arbitrary functions- Definition of general, particular and complete integrals - Solutions of first order equations of the form $F(p, q) = 0$, $F(x, p, q) = 0$, $F(y, p, q) = 0$, $F(z, p, q) = 0$, $F(x,p)= F(y, q)$ and $z=px + qy +f(p, q)$.

UNIT III: Laplace Transforms – Definitions and theorems – Some simple problems

UNIT IV: Inverse Laplace transforms - Some simple problems – Solving ordinary differential equations using Laplace Transforms.

UNIT V: Correlation Analysis – Correlation – Karl Pearson's Coefficient of Correlation –Regression – Lines of regression –Angle between two lines of Regression – Regression Coefficients.

Text Books:

1. **"Calculus, Vol. III " by S. Narayanan , T.K. Manicavachagom Pillay, 2013.**

    UNIT I   :   Chapter 2 -   Sections 1 2, 3,4a,4b,4c.

    UNIT II :   Chapter 4 -   Sections 2.1, 2.2, 3, 5.1 to 5.4

    UNIT III :   Chapter 5 -   Sections 1,2,4

    UNIT IV :   Chapter 5 -   Sections 6,7,8.

2. **"Probability and Statistics" by A. Singaravelu (for B.Sc. Computer Science – Allied Paper-III, Bharathidasan University) , A.R.Publications.**

    UNIT V : Chapter 4 -   All sections excluding Rank Correlation , Repeated ranks and Correction factors.

FIRST ALLIED I : MATHEMATICS I
(B.Sc. Computer Science Major)

Semester: I   Subject code:
Hours   : 4   Credits   : 4

Objectives:

1. To introduce the field of operations research which has many applications in management techniques.
2. To help students to find optimum solution in business and management problems.

UNIT I : Linear Programming Problem – Mathematical   Formulation –Product allocation problem-Product mix problem-Production problem only- Graphical Solution Method– Some Exceptional Cases-General Linear Programming Problem .

UNIT II : Transportation Problem – Definition – Formulation of Transportation problem -Finding an Initial Basic Feasible Solution – North-West Corner Rule – Matrix Minima Method – Vogel's Approximation Method – Unbalanced Transportation Problems.

UNIT III : Assignment Problem – Definition – Mathematical Formulation of the problem - Hungarian Method – Unbalanced Problems.

UNIT IV : Network Scheduling (**CPM)** – Introduction-Network –Rules of Network construction- Concurrent activities –Critical path analysis.

UNIT V : Network Scheduling (PERT) – PERT Calculations – t_0, t_m, t_p, t_e, σ only – Distinction between PERT and CPM.

Text Book: "Operations Research" by Kantiswarup, P.K.Gupta and Manmohan, Sultan Chand and Sons, Educational Publishers, New Delhi, 16th Edition, 2014.

UNIT I :   Chapter 2   - Sections 2.3 2.4 and Chapter 3- Sections 3.2 to 3.4

UNIT II :   Chapter 10 - Sections 10.1, 10.2(General form only),10.3, 10.9

UNIT III :   Chapter 11 - Sections 11.1, 11.2 (General form only),11.3

UNIT IV :   Chapter 25 - Sections 25.1, 25.2, 25.4 to 25.6

UNIT V :   Chapter 25 - Sections 25.7,25.8

FIRST ALLIED I : MATHEMATICS II
(B.Sc. Computer Science Major)

Semester :II   **Subject Code:**
Hours   : 4   **Credits   : 2**
Objectives:
1. To expose differential equations as a powerful tool in solving problems.
2. Introduction of Laplace transforms techniques to solve ODE's
3. To understand the various statistical methods by giving real life examples.

UNIT I : Ordinary differential equations of first order but of higher degree –
Equations   solvable for x,y and dy/dx, Clairaut's form. (Problems only)

UNIT II : Second order linear differential equations with constant coefficients –
particular   integrals for e^{ax}, sin ax, cos ax and x^m. (Problems only)

UNIT III : Laplace transforms – Laplace transforms for e^{at}, sinat, cosat, t^n, Laplace
transforms of f '(t) and f ''(t) .

UNIT IV: Inverse Laplace transforms related to the standard forms – Application of
Laplace transforms for solving ordinary differential equations with
constant coefficients.

UNIT V: Correlation Analysis – Correlation – Karl Pearson's Coefficient of
Correlation – Regression – Lines of regression –Angle between two
lines of Regression –   Regression Coefficients.

Text Books:
1. **"Calculus" Volume III by S.Narayanan, T.K.Manicavachagom
   Pillay,2013.**
   UNIT I :   Chapter 1 – Sections 5.1, 5.2, 5.3, 5.4, 6.1

   UNIT II :   Chapter 2 - Sections 1, 2, 3, 4(a, b & c only)

   UNIT III : Chapter 5 - Sections 1, 2, 4

   UNIT IV : Chapter 5 -   Sections 6, 7, 8

2. **"Probability and Statistics" by A. Singaravelu (for B.Sc. Computer
   Science – Allied Paper-III, Bharathidasan University) , A.R.Publications.**

   UNIT V: Chapter 4 - All sections excluding Rank Correlation , Repeated
   ranks and   Correction factors

FIRST ALLIED I : MATHEMATICS III
(B.Sc., Computer Science Major)

Semester: II   **Subject Code:**

Hours   : 4   **Credits   : 4**

Objectives:

1. To study the techniques to find the sum of different series
2. To study the characteristic roots and vectors of the matrix.
3. To know the concept of theory of equations.

UNIT I: Binomial theorem: Statement of Binomial theorem–Application of the Binomial   theorem to the summation of series-Exponential series-Statement of the Exponential theorem- Summation. (Simple problems only)

UNIT II: Transformations of equations –Roots with signs changed-Roots multiplied by a given number – To increase or decrease the roots of a given equation by a given quantity. (Simple problems only)

UNIT III: Reciprocal equations – Descarte's Rule of signs.

UNIT IV: Matrices: Notation-Special types of matrices –Scalar multiplication of a matrix –Equality of matrices –Addition of matrices –Subtraction –Multiplication of   matrices.(Simple problems only)

UNIT V: Inverse of a matrix – Rank of a matrix - Cayley-Hamilton theorem (Proof excluded). (Simple problems only)

Text Books:

1. "Algebra" Volume I by T.K.Manicavachagom Pillay, T.Natarajan and K.S.Ganapathy, 2016

> **UNIT I   :**   Chapter 3   - Section 1 ,10 and Chapter 4 - Sections 2 , 3
> **UNIT II :**   Chapter 6   - Sections 15.1,15.2 ,17.
> **UNIT III :**   Chapter 6   - Sections16 , 24

2. "Algebra" Volume II by T.K.Manicavachagom Pillay, T.Natarajan and K.S.Ganapathy, 2016

> **UNIT IV :**   Chapter 2 - Sections 1 to 7
> **UNIT V :**   Chapter 2 - Sections 8,11,16.3

FIRST ALLIED I : MATHEMATICS I
(For Statistics Major)

Semester: I   **Subject Code :**
Hours   : 4   **Credits   : 4**

Objectives :

1. To introduce several techniques of differentiation and integration of real valued functions.
2. To learn the applications of Beta and Gamma functions.

UNIT I :   Successive Differentiation - n^{th} derivative - standard results.

UNIT II :   Formations of equations involving derivatives – Leibnitz theorem (no proof) for   the nth derivative of a product.

UNIT III :   Integration:Formulae for integrals –Definite integrals – Integration by parts.

UNIT IV :   Properties of definite integrals.

UNIT V :   Beta and Gamma functions – Definitions – Recurrence formula of Gamma function –Properties of Beta function – Relation between Beta and Gamma function and Simple problems.

Text Books :

1.   " CALCULUS" Volume I by S. Narayanan and T.K. Manicavachagom Pillay, 2015.

   UNIT I :   Chapter 3 - Sections 1.1,1.2,1.3, 1.4

   UNIT II :   Chapter 3 - Sections 1.6 , 2.1

2.   "CALCULUS" Volume II by S. Narayanan and T.K.Manicavachagom Pillay, 2013.

   UNIT III :   Chapter 1   - Sections 2,3,4,12

   UNIT IV :   Chapter 1 - Section 11 only

   UNIT V :   Chapter 7 - Sections 2.1, 2.3, 3 ,4

FIRST ALLIED I : MATHEMATICS II
(For Statistics Major)

Semester: II   **Subject code:**

Hours   : 4   **Credits   : 2**

Objectives:

1. To expose differential equations as a powerful tool in solving problems.
2. To introduce different numerical techniques to solve algebraic equations.
3. To solve problems as quick as possible using short cut methods.

UNIT I : Second order differential equations with constant coefficients – Particular integrals   for e^{ax}, sinax, cosax, x^m .

UNIT II: Partial differential equations – Formation of equations by eliminating arbitrary constants and arbitrary functions. Solving partial differential equations (first order only).

UNIT III: Numbers – H.C.F. & L.C.M. of Numbers.

UNIT IV: Decimal fractions - Simplification.

UNIT V: Square root and cube root – Percentage.

Text books:

1. **"Calculus" Volume III by T.K.Manicavachagom Pillay , S.Narayanan, 2013**

   UNIT I   : Chapter 5 - Sections 1, 2, 4

   UNIT II : Chapter 5 - Sections 6 , 7

2. **"Quantitative Aptitude" by R.S.Aggarwal, S.Chand & Company Ltd, 2015.**

   UNIT III : Chapters 1 and 2

   UNIT IV: Chapters 3 and 4

   UNIT V :   Chapters 5 and 10.

FIRST ALLIED I : MATHEMATICS III
(For Statistics Major)

Semester: I   **Subject code:**

Hours   : 4   **Credits   : 4**

Objectives:

1. To study the characteristic roots of the matrix and Cayley Hamilton theorem.
2. To introduce several techniques for transforming equations.

UNIT I   : Matrices – Types of matrices – some simple problems – Characteristics equation – Eigen values. (Characteristic equations and Eigen values only)

UNIT II: Statement of Cayley Hamilton Theorem – Application of Cayley Hamilton theorem- Rank of a matrix– Finding the ranks of 2x2, 3x3 matrices using determinants.

UNIT III: Form an equation with given roots – imaginary roots occur in pairs – irrational roots occurs in pairs – Relation between roots and coefficients. (Problems only)

UNIT IV: Transformations of equations - Roots with sign changed – Roots multiplied by a   number – increase or decrease the roots – Form of the quotient and remainder when a   polynomial is divided by a binomial. (Problems only)

UNIT V: Reciprocal equations – Descarte's rule of signs .

Text books:

1. **"Algebra" volume II by T.K.Manicavachagom Pillay, T. Natarajan , K.S. Ganapathy, 2016.**

   UNIT I   : Chapter 2 - Sections 1 to 7,16
   UNIT II : Chapter 2 - Sections 11, 16.3 , 16.4

3. **"Algebra" volume I by T.K.Manicavachagom Pillay, T. Natarajan, K.S. Ganapathy, 2016**

   UNIT III : Chapter 6 - Sections 9, 10 , 11

   UNIT IV : Chapter 6 - Sections 15.1, 15.2,17,18

   UNIT V : Chapter 6 - Sections 16.1, 16.2,24

NON-MAJOR ELECTIVE I : OPTIMIZATION TECHNIQUES I
(II B.Com. Sec A & B)

Semester: IV   **Subject Code:**
Hours   : 2   **Credits   : 2**

Objectives:

1. To introduce the various techniques of research.
2. To make the students to solve the real-life problems in business and management.

UNIT I :   **Linear Programming Problem :** Graphical Method of solution for a given linear programming problem. (Simple problems only)

UNIT II :   **The Transportation Model :** Finding an Initial Basic Feasible Solution using North-west Corner Rule, Matrix Minima Method (Least Cost Method) and Vogel's Approximation Method. (Simple problems only)

UNIT III :   **The Assignment Model :** Solution of a given assignment problem - Balanced assignment problems only. (Simple problems only)

UNIT IV :   **Sequencing Models :** n jobs processing through two machines only. (Simple problems only)

UNIT V :   **Replacement Models :** Replacement of items whose maintenance and repair costs increase with Time, Ignoring Changes in the Value of Money during the Period. (Simple problems only)

Text Book:"Problems in Operations Research (Principles and Solutions)" by Er. Prem Kumar Gupta & Dr.D. S. Hira, S. Chand & Company Pvt. Limited, New Delhi, 2013

  UNIT I   **:**   Chapter 2 - Section 2.3

  UNIT II   **:**   Chapter 3 - Sections 3.2 to 3.4

  UNIT III   **:**   Chapter 4 -   Sections 4.1 to 4.5

  UNIT IV   **:**   Chapter 5 - Sections 5.1,5.2, 5.4

  UNIT V   **:**   Chapter 11 - Section 11.2 , excluding 11.2.1

NON-MAJOR ELECTIVE II : OPTIMIZATION TECHNIQUES II
(III B.Com. Sec.A & B)

Semester: VI   **Subject Code:**

Hours   : 2   **Credits   : 2**

Objectives:
1. To introduce the various techniques of research.
2. To make students solve real life problems in business and management

UNIT I: Sequencing Problems: Processing n jobs through three machines only. (Simple Problems only)

UNIT II: Theory of Games: Characteristics of games - definitions - Pure strategy – two   person zero -Sum game with saddle point – Mixed strategies (2*2 game) –   Graphical method for 2xn or mx2 games only. (Simple Problems only)

UNIT III: Inventory Problem: Inventory Models with Deterministic Demand – classical   EOQ model (with no shortage). (Simple Problems only)

UNIT IV: Project scheduling by CPM: Network – Critical Path Method. (Simple Problems   only)

UNIT V: Project scheduling by PERT: PERT calculations t_o, t_m, t_p, t_e, σ only. (Simple Problems only)

**Text Book:" Problems in Operations Research (Principles and Solutions)"
          by   Er. Premkumar Gupta & Dr. D .S. Hira, S. Chand &
          Company Limited, New Delhi, 2013.**

      UNIT I : Chapter 5   - Section   5.5

      UNIT II : Chapter 8   - Sections 8.4 -1 to 8.4-3, 8.4-6 , 8.4-7.3

      UNIT III : Chapter 12 - Sections 12.1 to 12.3 , 12.5-1

      UNIT IV : Chapter 14 - Sections 14.1 to 14.8

      UNIT V : Chapter 14 -   Section   14.9