# POOMPUHAR COLLEGE (AUTONOMOUS)

### *(of the Tamil Nadu H.R & C.E Department)*
### *(Accredited B+ By NAAC)*
### MELAIYUR - 609 107



# B.Sc SYLLABUS

# (FROM THE ACADEMIC YEAR 2019-2020 ONWARDS)

# PG & RESEARCH
# DEPARTMENT OF MATHEMATICS

# DEPARTMENT OF MATHEMATICS

# POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR

## COURSE STRUCTURE FOR UG COURSE

**(Applicable to the candidates admitted from the academic year 2019 – 2020 onwards)**

| SEMESTER | PART | SUBJECT | HRS | CREDIT | EXAM | MARKS |
|---|---|---|---|---|---|---|
| I | I | Tamil – I | 6 | 3 | 3 | 100 |
| | II | English – I | 6 | 3 | 3 | 100 |
| | III | First Allied – I | 5 | 3 | 3 | 100 |
| | | First Allied – II | 3 | * | * | * |
| | | Core Course – I | 5 | 5 | 3 | 100 |
| | | Core Course – II | 3 | * | * | * |
| | IV | Value Education | 2 | 2 | 3 | 100 |
| | | **Total** | **30** | **16** | | **500** |
| II | I | Tamil – II | 6 | 3 | 3 | 100 |
| | II | English – II | 6 | 3 | 3 | 100 |
| | III | First Allied – II | 3 | 4 | 3 | 100 |
| | | First Allied – III | 5 | 3 | 3 | 100 |
| | | Core Course – II | 3 | 5 | 3 | 100 |
| | | Core Course – III | 5 | 5 | 3 | 100 |
| | IV | Environmental Studies | 2 | 2 | 3 | 100 |
| | | **Total** | **30** | **25** | | **700** |
| III | I | Tamil – III | 6 | 3 | 3 | 100 |
| | II | English – III | 6 | 3 | 3 | 100 |
| | III | Second Allied – I | 5 | 3 | 3 | 100 |
| | | Second Allied – II | 3 | * | * | * |
| | | Core Course – IV | 5 | 5 | 3 | 100 |
| | | Core Course – V | 3 | * | * | * |
| | IV | Non Major Elective – I | 2 | 2 | 3 | 100 |
| | | **Total** | **30** | **16** | | **500** |
| IV | I | Tamil – IV | 6 | 3 | 3 | 100 |
| | II | English – IV | 6 | 3 | 3 | 100 |
| | III | Second Allied – II | 3 | 4 | 3 | 100 |
| | | Second Allied – III | 4 | 3 | 3 | 100 |
| | | Core Course – V | 2 | 4 | 3 | 100 |
| | | Core Course – VI | 5 | 4 | 3 | 100 |
| | IV | Non Major Elective – II | 2 | 2 | 3 | 100 |
| | | Skill Based Elective – I | 2 | 2 | 3 | 100 |
| | | **Total** | **30** | **25** | | **800** |

| SEMESTER | PART | SUBJECT | HRS | CREDIT | EXAM | MARKS |
|----------|------|---------|-----|--------|------|-------|
| V | III | Core Course – VII | 5 | 5 | 3 | 100 |
| | | Core Course – VIII | 5 | 5 | 3 | 100 |
| | | Core Course – IX | 5 | 5 | 3 | 100 |
| | | Core Course – X | 5 | 5 | 3 | 100 |
| | | Major Based Elective – I | 6 | 5 | 3 | 100 |
| | IV | Skill Based Elective – II | 2 | 2 | 3 | 100 |
| | | Skill Based Elective – III | 2 | 2 | 3 | 100 |
| | | **Total** | **30** | **29** | | **700** |
| VI | III | Core Course – XI | 5 | 5 | 3 | 100 |
| | | Core Course – XII | 5 | 5 | 3 | 100 |
| | | Core Course – XIII | 5 | 5 | 3 | 100 |
| | | Major Based Elective – II | 6 | 5 | 3 | 100 |
| | | Major Based Elective – III | 6 | 5 | 3 | 100 |
| | IV | Soft Skills Development | 2 | 2 | 3 | 100 |
| | | Gender Studies | 1 | 1 | 3 | 100 |
| | V | Extension Activities | - | 1 | - | - |
| | | **Total** | **30** | **29** | | **700** |
| | | **Grand Total** | **180** | **140** | | **3900** |

Note: * Examination at the end of the even semester

**Head of the Department**                                              **Principal**

# POOMPUHAR COLLEGE (AUTONOMOUS)
## of the Tamil Nadu HR & CE Department
## MELAIYUR - 609 107

### B.ScMathematics – Course Structure under CBCS
### (For the candidates admitted from the academic year 2019 -2020 onwards)

| Semester | Part | Course | Title | Instr Hours /Week | Credit | Exam Hours | Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Internal | External | |
| I | I | Tamil Language Course –I | Tamil – I | 6 | 3 | 3 | 25 | 75 | 100 |
| | II | English Language Course -I | English – II | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course - I (CC) | Differential Calculus and Trigonometry | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course - II (CC) | Probability& Statistics | 3 | - | ** | - | - | - |
| | | First Allied Course - I (AC) | Allied Physics – I | 5 | 3 | 3 | 25 | 75 | 100 |
| | | First Allied Course - II (AC) | Allied Physics – II (Practical) | 3 | - | ** | - | - | - |
| | IV | Value Education | | 2 | 2 | 3 | 25 | 75 | 100 |
| | | | **Total** | **30** | **16** | | | | **500** |
| II | I | Tamil Language Course – II | Tamil - II | 6 | 3 | 3 | 25 | 75 | 100 |
| | II | English Language Course - II | English – II | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course - II (CC) | Probability& Statistics | 3 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course – III (CC) | Analytical Geometry (3D) and Integral Calculus | 5 | 5 | 3 | 25 | 75 | 100 |
| | | First Allied Course – II (AC) | Allied Physics – II (Practical) | 3 | 4 | 3 | 25 | 75 | 100 |
| | | First Allied Course – III (AC) | Allied Physics - III | 5 | 3 | 3 | 25 | 75 | 100 |
| | IV | Environmental Studies | | 2 | 2 | 3 | 25 | 75 | 100 |
| | | | **Total** | **30** | **25** | | | | **700** |

| Semester | Part | Course | Title | Instr Hours /Week | Credit | Exam Hours | Internal | External | Total |
|----------|------|--------|-------|-------------------|--------|------------|----------|----------|-------|
| | | | | | | | **Marks** | | |
| III | I | Tamil Language Course – III | Tamil - III | 6 | 3 | 3 | 25 | 75 | 100 |
| | II | English Language Course-III | English - III | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course – IV (CC) | Algebra and Theory of Numbers | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course – V (CC) | Vector Calculus and Fourier Series | 3 | - | ** | - | - | - |
| | | Second Allied Course – I (AC) | Allied Chemistry - I | 5 | 3 | 3 | 25 | 75 | 100 |
| | | Second Allied Course – II (AC) | Allied Chemistry – II (Practical) | 3 | - | ** | - | - | - |
| | IV | Non Major Elective – I | Fundamentals of Mathematical Statistics – I | 2 | 2 | 3 | 25 | 75 | 100 |
| | | | **Total** | **30** | **16** | | | | **500** |
| IV | I | Tamil Language Course – IV | Tamil – IV | 6 | 3 | 3 | 25 | 75 | 100 |
| | II | English Language Course – IV | English - IV | 6 | 3 | 3 | 25 | 75 | 100 |
| | III | Core Course – V (CC) | Vector Calculus and Fourier Series | 2 | 4 | 3 | 25 | 75 | 100 |
| | | Core Course – VI (CC) | Sequences and Series | 5 | 4 | 3 | 25 | 75 | 100 |
| | | Second Allied Course – II (AC) | Allied Chemistry – II (Practical) | 3 | 4 | 3 | 25 | 75 | 100 |
| | | Second Allied Course – III (AC) | Allied Chemistry - III | 4 | 3 | 3 | 25 | 75 | 100 |
| | IV | Non Major Elective – II | Fundamentals of Mathematical Statistics- II | 2 | 2 | 3 | 25 | 75 | 100 |
| | | Skill Based Elective – I | Fundamentals of computer | 2 | 2 | 3 | 25 | 75 | 100 |
| | | | **Total** | **30** | **25** | | | | **800** |

| Semester | Part | Course | Title | Instr Hours /Week | Credit | Exam Hours | Marks Internal | Marks External | Total |
|---|---|---|---|---|---|---|---|---|---|
| V | III | Core Course – VII (CC) | Differential Equations and Laplace Transforms | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course – VIII (CC) | Abstract Algebra | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course – IX (CC) | Real Analysis | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course – X (CC) | Operations Research | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Major Based Elective-I | Mechanics / Fluid Dynamics | 6 | 5 | 3 | 25 | 75 | 100 |
| | IV | Skill Based Elective – II | Windows Operating System | 2 | 2 | 3 | 25 | 75 | 100 |
| | | Skill Based Elective – III | M.S.Office | 2 | 2 | 3 | 25 | 75 | 100 |
| | | | **Total** | **30** | **29** | | | | **700** |
| VI | III | Core Course – XI (CC) | Methods In Numerical Analysis | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course – XII (CC) | Complex Analysis | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Core Course – XIII (CC) | Graph Theory | 5 | 5 | 3 | 25 | 75 | 100 |
| | | Major Based Elective –II | Programming in C / Programming in C ++ | 6 | 5 | 3 | 25 | 75 | 100 |
| | | Major Based Elective -III | Discrete Mathematics/ Automata Theory | 6 | 5 | 3 | 25 | 75 | 100 |
| | IV | Soft Skills Development | | 2 | 2 | 3 | 25 | 75 | 100 |
| | | Gender Studies | | 1 | 1 | 3 | 25 | 75 | 100 |
| | V | Extension Activities | | - | 1 | - | - | - | - |
| | | | **Total** | **30** | **29** | | | | **700** |
| | | | **Grand Total** | **180** | **140** | | | | **3900** |

# POOMPUHAR COLLEGE (AUTONOMOUS), MELAIYUR

## COURSE STRUCTURE FOR ALL UG DEGREE COURSES

**(Applicable to the candidates admitted from the academic year 2019 – 2020 onwards)**

| PART | NAME OF THE PAPERS | NUMBER OF PAPERS | CREDITS |
|------|--------------------|------------------|---------|
| I | TAMIL | 04 | 12 |
| II | ENGLISH | 04 | 12 |
| III | CORE (INCLUDING OPTIONAL) | 16 | 78 |
| | FIRST ALLIED | 03 | 10 |
| | SECOND ALLIED | 03 | 10 |
| IV | NON-MAJOR ELECTIVE | 02 | 04 |
| | SKILLBASED ELECTIVE | 03 | 06 |
| | VALUE EDUCATION | 01 | 02 |
| | ENVIRONMENTAL STUDIES | 01 | 02 |
| | SOFT SKILLS DEVELOPMENT | 01 | 02 |
| | GENDER STUDIES | 01 | 01 |
| V | EXTENSION ACTIVITIES | -- | 01 |
| | **TOTAL** | **39** | **140** |

**Head of the Department**                                                          **Principal**

**List of Allied Courses**

1. Physics

2. Chemistry

**Note:**

|  | Internal Marks | External Marks |
|---|---|---|
| 1. Theory | 25 | 75 |
| 2. Practical | 40 | 60 |
| 3. Separate passing minimum is prescribed for Internal and External marks | | |

The passing minimum for CIA shall be 40% out of 25 marks [ie, 10 marks]

The passing minimum for External Examinations shall be 40% out of 75 marks [ie, 30 marks]

** Examination at the end of the next semester.

   Extension activities shall be outside the instruction hours.

**Question Paper Pattern (for Part I, II, III)**

**Part A**

Ten questions                                                    10 x 2 = 20 marks

(Two questions from each unit – No choice)

**Part B**

Five questions (either or type)                          5 x 5 = 25 marks

(One question from each unit)

**Part C**

Three questions out of five                               3 x 10 = 30 marks

(One question from each unit)

                                                                    ---------------------------

                                          Total                75 marks

                                                                    ---------------------------


**Question Paper Pattern (for Part IV only)**

**Part A**

Three questions (either or type)                        3 x 10 = 30 marks

(One question from each unit)

**Part B**

Three questions out of five                               3 x 15 = 45 marks

(Atleast one question from each unit,

Not more than two questions from each unit,

**No unit shall be omitted**)

                                                                    ---------------------------

                                          Total                75 marks

                                                                    ---------------------------


**Head of the Department**                                    **Principal**

**Programme Outcomes:**

**PO1: Disciplinary Knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

**PO2: Critical Thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

**PO3: Problem Solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

**PO4: Analytical & Scientific Reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints. Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

**PO5: Self-directed & Lifelong Learning:** Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

**Programme Specified Outcomes:**

**PSO1:** Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

**PSO2:** Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

**PSO3:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate start-ups and high potential organizations.

**PSO4:** To apply their skill and knowledge that is translate information presented verbally into mathematical form, select and use appropriate mathematical formulate or techniques in order to process the information and draw the relevant conclusion.

**PSO5:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE Department**
**Department of Mathematics**
(For those who are joining in 2019 – 2020 and after)

| | |
|---|---|
| **Programme** : B.Sc Mathematics | **Subject Code :** |
| **Semester** : I | **No of hours** : 5 |
| **Part III** : Core Paper I | **No of credits** : 5 |

**Title of the Paper: DIFFERENTIAL CALCULUS AND TRIGONOMETRY**

**Objectives:**
1. To inculcate the basics of differentiation and their applications.
2. To introduce the notion of curvatures, Evolute & Involute and polar co-ordinates.
3. To understand the basic concepts of Trigonometry

**Unit - I**

Methods of successive differentiation – Leibnitz's theorem and its applications– Increasing and decreasing functions –Maxima and Minima of function of two variables.

**Unit - II**

Envelopes - Curvature – Radius of curvature in Cartesian coordinates and polar coordinates – Centre of curvature – Evolute and Involute – Pedal equation of a curve.

**Unit - III**

Expansions of sin (nx), cos (nx), tan (nx) – Expansions of $\sin^n x$, $\cos^n x$ – Expansions of sin(x),cos(x), tan(x) in ascending powers of x.

**Unit - IV**

Hyperbolic functions – Relation between hyperbolic & circular functions– Inverse hyperbolic functions.

**Unit - V**

Logarithm of a complex number – Summation of trigonometric series – Difference method– Angles in arithmetic progression method – Gregory's series

**Text Books**
[1] S.Narayanan, T.K.ManickavasagamPillai, Calculus, Vol .I, S.V Publications, 2014. (Units I and II)
[2] S.Arumugam, A.ThangapandiIssac, Theory of equations and Trignometry, New Gamma Publications, 2006. (Units III, IV and V)

**Unit -I**:        Chapter III, Sections 1.1 to 1.6, 2.1, 2.2
                Chapter IV, Sections 2.1,2.2
                Chapter VIII, Section 4.1                [1]
**Unit -II** :       Chapter X, Sections 1.1 to 1.4, 2.1 to 2.7     [1]

**Unit –III**:     Chapter VI, Sections 6.1 to 6.3    [2]

**Unit –IV**:    Chapter VII, Sections 7.1, 7.2    [2]

**Unit – V**:    Chapter VIII, Section 8.1

                Chapter IX, Sections 9.1 to 9.4   [2]

**Course outcomes:**

    At the end of the course the student will be able to

1. Demonstrate the properties of higher derivatives
2. Examine the maxima and minima functions
3. Perceive the difference between trigonometric function and hyperbolic functions
4. Determine the sum of the trigonometry series.
5. Understand the concept of logarithm of complex numbers.

**Reference Books**

[1] S.Arumugam and Isaac, Calculus, Volume1, New Gamma Publishing House, 1991.

[2] S.Narayanan, T.K.ManichavasagamPillai, Trigonometry, S.ViswanathanPvt
Limited and Vijay Nicole Imprints PvtLtd, 2004.

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 3 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 2 | 2 | 2 |
| CO4 | 2 | 3 | 2 | 3 | 2 |
| CO5 | 3 | 3 | 2 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE Department**
**Department of Mathematics**
(For those who are joining in 2019 – 2020 and after)

| | | |
|---|---|---|
| **Programme** : B.Sc Mathematics | | **Subject Code :** |
| **Semester** : II | | **No of hours : 6** |
| **Part III** : Core Paper II | | **No of credits :5** |

**Title of the Paper:PROBABILITY & STATISTICS**

**Objectives:**

1. To inculcate the basics of theory of probability.
2. To understand the concepts of correlation, regression & distributions.

**Unit - I**

Theory of Probability –Definition of probability sample space – Probability of an event - Independence of events – Theorems on Probability – Conditional Probability – Baye's Theorem.

**Unit - II**

Random variables – Distribution functions – Discrete & continuous random variables – Probability mass & density functions –Joint probability distribution functions.

**Unit - III**

Expectation – Variance – Moment generating functions –Theorems on Moment generating functions –Moments – Various measures.

**Unit - IV**

Correlation & Regression –Properties of Correlation & regression coefficients – Numerical Problems for finding the correlation & regression coefficients.

**Unit - V**

Theoretical Discrete & Continuous distributions – Binomial, Poisson, Normal distributions-Moment generating functions of these distributions – Additive properties of these distributions- Recurrence relations for the moments about origin and mean for the Binomial. Poisson and Normal distributions –Properties of normal distributions.

**Text Book(s)**

[1]. P. R Vittal , Mathematical Statistics, Margham Publications.

        **Unit – I**      - Chapter 1
        **Unit – II**     - Chapter 2
        **Unit – III**    - Chapters 3,4,5,7.
        **Unit – IV**    - Chapters 8,9 (exceptbivariatefrequency distribution problem
        & Probable error)

**Unit – V** - Chapters 12,13&16.

**Reference Book(s)**

[1].Thambidurai .P, Practical Statistics, Rainbow publishers – CBE (1991)

**Course outcomes:**

At the end of the course the student will be able to

1. Gain the knowledge of techniques in solving real life problems.
2. Analyse the Correlation and Regression concepts.
3. Knowledge of solving the problems on measures.
4. Understand the concept of moment generating function.
5. Determine the probabilities for distributions.

**Signature of the Subject Experts:**                           **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 3 | 2 |
| **CO2** | 3 | 3 | 2 | 3 | 2 |
| **CO3** | 3 | 2 | 3 | 2 | 2 |
| **CO4** | 2 | 3 | 3 | 3 | 2 |
| **CO5** | 3 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**          **Subject Code :**
**Semester      : II**                                    **No of hours   : 5**
**Part III         : Core Paper III**               **No of credits  : 5**

**Title of the Paper: ANALYTICAL GEOMETRY (3D) AND INTEGRAL CALCULUS**

**Objectives:**

1. To study about three dimensional Cartesian Co-ordinates system
2. To inculcate the basics of integration and their applications.

**Unit - I**

     Standard equation of a plane – Intercept form - Normal form – Plane passing through given points – Angle between planes – Plane through the line of intersection of  two planes – Equation of the straight line – Shortest distance between two skew lines – Equation of the line of shortest distance.

**Unit - II**

     Sphere – Standard equation – Sphere passing through a given circle – Intersection of two spheres – Tangency of spheres.

**Unit - III**

     Properties of definite integrals: Integration by parts – Definite integrals and Reduction formula.

**Unit - IV**

     Double integrals – Changing the order of Integration – Triple integrals.

**Unit - V**

     Beta and Gamma functions – Properties of Beta functions and the relation between them – Applications of Gamma functions to multiple integrals.

**Text Books**

[1] T.K.ManickavasagamPillai andT.Natarajan, Analytical Geometry, S.V Publications,
    1985 Revised Edition.(Units I and II)
[2] S.Narayanan and T.K.ManickavasagamPillai, Calculus, Vol.II, SV Publications, 2013.
(Units III, IV and V).

**Unit -I**  : Chapter I, Sections 1,2, 5 to 11

       Chapter II Sections 1 to 11

       Chapter III, Sections 1 to 8.          [1]

**Unit -II** : Chapter IV Sections 1 to 8.[1]

**Unit - III**: Chapter I, Sections 11, 12, 13.1-13.10 [2]

**Unit - IV**:Chapter V, Sections 1, 2.1. 2.2,3.1,3.2, 4     [2]

**Unit -V** :Chapter VII, Sections 2.1-2.3, 3, 4, 5, 6 [2]

### Reference Books

[1] Duraipandian and Chatterjee, Analytical Geometry.

[2] Shanti Narayan, Differential and Integral Calculus..

### Course outcomes:

At the end of the course the student will be able to

1.  Illustrate the knowledge of geometry and its applications
2.  Apply appropriate techniques, tools and formulas to determine measurements in geometry
3.  Formulate the equations of line, plane and sphere.
4.  Evaluate multiple integrals
5.  Understand the recurrence formula and properties of beta and gamma function.

**Signature of the Subject Experts:**                         **Signature of the HOD**

### Outcome Mapping

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 3 | 2 |
| CO2 | 3 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 3 | 2 |
| CO4 | 2 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

| | | |
|---|---|---|
| **Programme  : B.Sc Mathematics** | | **Subject Code :** |
| **Semester    : III** | | **No of hours   : 5** |
| **Part III       : Core Paper IV** | | **No of credits  : 5** |

**Title of the Paper: ALGEBRA AND THEORYOF NUMBERS**

**Objectives:**

1. To lay a good foundation for the study of Theory of Equations.
2. To train the students in operative algebra.

**Unit - I**

Relation between roots and coefficients of polynomial equations – Symmetric functions –Sum of the $r^{th}$ powers of the roots –Two methods.

**Unit - II**

Transformations of equations – Diminishing, increasing and multiplying the roots by a constant – Forming equations with the given roots – Reciprocal equations – All types – Descarte's rule of signs (statement only) – Simple problems.

**Unit- III**

Inequalities – Elementary principles – Geometric and Arithmetic means –Weirstrass inequalities – Cauchy inequality – Applications to maxima and minima.

**Unit - IV**

Algebra of matrices – Types of matrices – Symmetric – Skew-symmetric, Orthogonal, Hermetian – Skew-Hermitian, Unitary matrices – Rank of a matrix – Consistency – Eigen values, Eigen vectors – Cayley Hamilton's theorem (Statement only).

**Unit- V**

Theory of numbers – Prime and composite numbers – Divisors of a given number N – Euler's function $\phi(N)$ and its value – The highest power of a prime P contained in N!

**Text  Books**

[1]T.K.ManickavasagamPillai, T.Natarajan, K.S.Ganapathy, Algebra Volume I, S.V

Publications –1985 Revised Edition (Unit I and II)

[2]T.K.ManickavasagamPillai,T.Natarajan, Algebra Volume II, S.V Publications – 1985,

Revised edition. (Unit III and V)

[3] S.Arumugam,A.ThangapandiIssac, Modern Algebra, New Gamma Publishing House,

2000. (Unit IV)

**Unit - I** : Chapter VI, Sections 11 to 14        [1]

**Unit-II** :Chapter VI, Sections 15 to 21 and 24  [1]

**Unit-III**: Chapter IV[2]

**Unit-IV**:Chapter VII, Sections 7.1, 7.2, 7.5 to 7.8. [3]

**Unit-V** :Chapter V  [2]

**Reference Books**

[1]H.S.Hall and S.R. Knight. Higher Algebra, Prentice Hall of India, New Delhi,

[2]H.S.Hall and S.R. Knight. Higher Algebra, McMillan and Co. London. 1948.

**Course outcomes:**

At the end of the course the student will be able to

1. Understand to find the summation of the powers of the  roots of the equation.
2. Know to solve the algebraic equations.
3. Acquire idea about inequalities.
4. Understand the concept of algorithms to find the factors of composite numbers
5. Understand the concept of congruence and its related theorems.


**Signature of the Subject Experts:**                                **Signature of the HOD**


**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 2 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 3 | 2 |
| **CO3** | 3 | 2 | 2 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme    : B.Sc Mathematics**                    **Subject Code :**
**Semester       : IV**                                            **No of hours   : 5**
**Part III          : Core Paper V**                          **No of credits  : 4**

**Title of the Paper: VECTOR CALCULUS AND FOURIER SERIES**

**Objectives:**

1. To provide the basic knowledge of vector differentiation and vector integration.

2. To solve the vector differentiation and vector integration problems.

**Unit - I**

      Vector differentiation: – Velocity and acceleration– Gradient, Curl and Divergence– Divergence and Curl of a Vector point function - Vector identities – Simple problems.

**Unit -II**

      Vector integration: Line integral - Surface and Volume integral – Simple problems.

**Unit - III**

      Gauss Divergence Theorem –Stoke's Theorem – Green's Theorem – Simple problems and verification of the theorems for simple problems.

**Unit - IV**

      Fourier series – Definition – Fourier Series expansion of periodic functions with Period $2\pi$– Use of odd and even functions in Fourier Series.

**Unit - V**

      Half-range Fourier series – Definition – Development in cosine series and in sine series – Change of interval –Combination of series.

**Text  Books**

[1]  P.RVittal, V. Malini,Vector Calculus Fourier Series and Fourier Transforms, Margham

Publications, 2007. (Units I to III)

[2]S.Narayanan, T.K.ManickavasagamPiliai, Calculus, Vol. III, S. Viswanathan Pvt Ltd,2011. (Units IV, V)

**Unit - I** :Chapter I     [1]

**Unit - II** :Chapter II    [1]

**Unit - III**:Chapter II    [1]

**Unit - IV**:Chapter VI, Sections 1 to 3 [2]

**Unit -V**: Chapter VI, Sections 4 to 7 [2]

**Reference Book**

[1] P.Kandasamy, K.Thilagavathi, Vector Calculus Fourier Series and Fourier Transforms,

S. Chand & Company Ltd, 2005.

**Course outcomes:**

At the end of the course the student will be able to

1. Perceive the knowledge of vector differentiation and vector integration.
2. Formulate the relationship between gradient, divergence and curl
3. Determine the sum of the cosines and sine series
4. Determine the Fourier expansion of functions
5. Expand the functions as Fourier sine and cosine series

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 2 |
| CO3 | 3 | 2 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**          **Subject Code :**
**Semester      : IV**                                      **No of hours   : 5**
**Part III         : Core Paper VI**                    **No of credits  : 4**

**Title of the Paper: SEQUENCES AND SERIES**

**Objectives:**

1. To lay a good foundation for classical analysis.

2. To study the behavior of sequences and series.

**Unit - I**

Sequence (definition), Limit, convergence of a sequence – Cauchy's general principle of convergence – Cauchy's first theorem on limits – Bounded sequences – Monotonic sequence always tends to a limit finite or infinite – Limit superior and limit inferior.

**Unit - II**

Infinite series – Definition of convergence, divergence and oscillation – Necessary condition for convergence – Convergence of $\sum \dfrac{1}{n^p}$ and Geometric series – Comparison test.

**Unit - III**

D'Alembert's ratio test – Cauchy's condensation test – Cauchy's root test and their simple problems.

**Unit - IV**

Binomial Theorem for a rational index – Exponential and Logarithmic series – Summation of series using these theorems.

**Unit - V**

General summation of series including successive difference and recurring series.

**Text Book**

[1] T.K. ManickavasagamPillai, T. Natarajan, K.S. Ganapalhy, Algebra, Vol. I,
S. ViswanathanPvt Limited, Chennai. 2004.

**Unit – I**: Chapter II, Sections 4, 6 & 7

**Unit - II**: Chapter II, Sections 8 to 14

**Unit –III**: Chapter II, Sections 15 to 17

**Unit - IV**: Chapter III,Sections 5,6,10

Chapter IV Sections 1, 2, 3, 5 and 9

**Unit - V**: Chapter V

**Reference Books**

[1] M.K.Singal, Asha Rani Singal, A first course in Real Analysis, R. Chand & Co.1999.

[2] Dr.S.Arumugam, Sequences and Scries, New Gamma Publishers, 1999.

**Course outcomes:**

    At the end of the course the student will be able to

  1. Understand the behaviour of monotonic sequences.
  2. Know about the limits.
  3. Get idea about the behaviour of convergence and divergence of series by using
     various tests.
  4.  Solve the problems related to sequences and series.
  5.  Test the convergences of the series

**Signature of the Subject Experts:**                **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 3 | 2 |
| **CO3** | 3 | 2 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**          **Subject Code :**
**Semester      : V**                                     **No of hours   : 5**
**Part III        : Core Paper VII**             **No of credits  :5**

**Title of the Paper: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS**

**Objectives:**

1. To know the order and degree of the ODE's

2. To make difference between ODE and PDE

3. To know the concept of Laplace transforms and its inverse with applications

**Unit - I**

First order, higher degree differential equations solvable for x, solvable for y, solvable for $\frac{dy}{dx}$

–Clairaut's form – Conditions of integrability of  Mdx + Ndy = 0 – Simple problems.

**Unit - II**

        Particular integrals of second order Differential Equations with constant coefficients – Linear equations with variable coefficients – Method of variation of parameters (omit third and higher order equations)

**Unit - III**

        Formation of Partial Differential Equation – General ,particular and complete integrals – Solution of PDE of the standard forms – Lagrange's method of solving –Charpit's method and a few standard forms.

**Unit - IV**

        PDE of second order homogeneous equation with constant coefficients – Particular integrals of  F (D,D') z = f (x,y), where f (x,y) is of one  of the forms  $e^{(ax+by)}$,  sin (a x + b y), cos (a x + b y), $x^r y^s$ , and $e^{(ax+by)}$ f(x,y).

**Unit - V**

        Laplace transforms – Standard formulae – Basic theorems and simple applications – Inverse Laplace transform – Use of Laplace transform in solving ODE with constant coefficients.

**Text  Books**

[1]S.Narayanan, T.K.ManickavasagamPillai, Calculus, Vol. III, S.V Publications, 2011.

    (Units I, II, III, V)

[2] M.D.Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co.,New

Delhi, 2006. (Unit IV)

**Unit - I** : Chapter I, Sections 3.1 to 3.3, 4, 5.1 to 5.5, 6.1 [1]

**Unit - II** : Chapter II, Sections 1.1 , 1.2, 2, 3, 4, 8.1 to 8.3, 10 [1]

**Unit - III**: Chapter IV Sections 2.1, 2.2, 5.1 to 5.4, 6.1, 7 [1]

**Unit - IV**: Part Three, Chapter III, Sections 3.1 to 3.7 [2]

**Unit - V** : Chapter V Sections 1.1, 1.2, 4, 5, 6, 7, 8 [1]

**Reference Books**

[1] S.Narayanan, Differential Equations, S.Viswanathan Publishers, 1996.

[2] M.L. Khanna, Differential Calculus, Jaiprakashnath and Co., Meerut, 2004.

**Course outcomes:**

At the end of the course the student will be able to

1. Find the solutions of linear ordinary and partial differential equations.
2. Categorize the partial differential equations
3. Formulate the partial differential equation suing various methods
4. Solve PDE of second order homogeneous equation with constant coefficients.
5. Solve ODE using the concept of Laplace Transform.


**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 2 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 2 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**               **Subject Code :**

**Semester      : V**                                           **No of hours   : 5**

**Part III          : Core Paper VIII**                    **No of credits  : 5**

**Title of the Paper: ABSTRACT ALGEBRA**

**Objectives:**

1. To introduce the concept of Algebra from the basic set theory and functions etc.,

2. To introduce the concept of Group Theory, Rings and Vector Spaces.

**Unit - I**

Groups: Subgroups – Cyclic groups – Order of an element – Cosets and Lagrange's theorem.

**Unit - II**

Normal subgroups and Quotient groups – Isomorphism –Homomorphisms.

**Unit - III**

Rings: Definition and examples – Elementary properties of rings – Isomorphism – Types of rings –Characteristic of a ring - Subrings – Ideals – Quotient rings – Maximal and Prime ideals - Homomorphism of rings .

**Unit - IV**

Vector Spaces – Definition and examples – Subspaces – Linear transformation – Span of a set – Linear independence.

**Unit - V**

Basis and Dimension – Rank and Nullity – Matrix of a linear transformation.

**Text Book**

[1] S.Arumugam, A.Thangapandi Isaac, Modern Algebra, New Gamma Publishing House,

1997.

**Unit - I**  :Chapter III, Sections 3.5 to 3.8

**Unit - II**:Chapter III,Sections 3.9 to 3.12

**Unit - III**:Chapter IV, Sections 4.1 to 4.10

**Unit - IV**:Chapter V, Sections 5.1 to 5.5

**Unit - V**: Chapter V, Sections 5.6 to 5.8

**Reference Books**

[1] T.K. Manickavasagam Pillai, T.Natarajan, K.S. Ganapathy, Algebra, Vol. I,
S.Viswanathan Pvt Limited, Chennai, 2004
[2] M.L. Santiago,Modern Algebra, Tata McGraw Hill, 2003.

**Course outcomes:**

At the end of the course the student will be able to

1. Acquire knowledge of basic abstract systems of mathematics.
2. Know the concepts and properties of various algebraic structures.
3. Understand the importance of homomorphism and isomorphism in various algebraic structures.
4. Understand the concepts of groups, rings and vector spaces.
5. Define the linear transformation, linearly independence and lineally dependence on vector space

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

## POOMPUHAR COLLEGE (AUTONOMOUS)
### of the Tamil Nadu HR & CE Department
### Department of Mathematics
(For those who are joining in 2019 – 2020 and after)

**Programme** : B.Sc Mathematics        **Subject Code :**

**Semester** : V        **No of hours : 5**

**Part III** : Core Paper IX        **No of credits : 5**

**Title of the Paper: REAL ANALYSIS**

**Objectives:**

1. To provide a comprehensive idea about the real number system.

2. To understand the concept of continuity, Differentiation and Riemann Integrals.

**Unit - I**

Real Number system – Field axioms – Order relation in R – Absolute value of a real number and its properties – Supremum and Infimum of a set – Order completeness property – countable and uncountable set.

**UNIT - II**

Continuous functions – Limit of a function – Algebra of limits – Continuity of a function – Types of discontinuities – Elementary properties of continuous functions – Uniform continuity of function.

**UNIT - III**

Differentiability of a function – Derivability and continuity – Algebra of derivatives – Inverse function Theorem – Daurboux's theorem on derivatives.

**UNIT - IV**

Rolle's theorem – Mean value theorems on derivatives – Taylor's theorem with remainder – Power series expansion.

**UNIT - V**

Riemann integration – Definition – Daurboux's theorem – Conditions for integrability –Integrability of continuous and monotonic functions – Integral functions – Properties of integrable functions – Continuity and derivability of integral functions – The first Mean value theorem and the fundamental theorem of Calculus.

**Text Books**

[1] M.K,Singhal, Asha Rani Singhal, A First Course in Real Analysis, R.Chand& Co., 1997.
   (Units I to IV)

[2]Shanthi Narayan, A Course of Mathematical Analysis, S. Chand & Co., 1995. (Unit V)

**Unit – I**- Chapter 1 of                    [1]
**Unit – II** - Chapter 5 of                    [1]
**Unit – III** - Chapter 6 – Sec 1 to 5 of [1]
**Unit – IV** - Chapter 8 – Sec 1 to 6 of [1]
**Unit – V** - Chapter 9                    [2]

**Reference Book**

[1]Gold Berge, Richar R,Methods of Real Analysis, Oxford & IBHP Publishing Co., New Delhi, 1970.

**Course outcomes:**

At the end of the course the student will be able to

1. Illustrate the effect of uniform convergence on the limit functions with respect to continuity, differentiability and integrability.
2. Apply the mean value theorems, Taylor's theorem and L'Hospitals rules.
3. Locate and classify discontinuities of a given functions.
4. Understand the concept about Riemann Integration
5. Acquire the knowledge about Inerrability of continuous and monotonic functions

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**                          **Subject Code :**
**Semester      : V**                                                   **No of hours    : 5**
**Part III         : Core Paper X**                               **No of credits  : 5**

**Title of the Paper: OPERATIONS RESEARCH**

**Objectives:**

1. To introduce the various techniques of Operations Research.
2. To make the students solve real life problems in Business and Management

**Unit - I**

Linear programming problem – Mathematical formulation  – Graphical Solution – Standard form of LPP – Simplex method.

**Unit - II**

Artificial Variable Technique – Primal and Dual problems – Duality – Dual Simplex method.

**Unit - III**

General Transportation Problem – North – west corner rule, Least cost, VAM, Modi Methods, Degeneracy unbalanced problems. Assignment problem : Hungarian method – Unbalanced assignment problem.

**Unit - IV**

Two person Zero sum games – The Maximin –Minimax Principle – Games without Saddle points – Mixed Strategies – Graphical Solution of 2 x n and m x 2 games – Dominance property.

**Unit - V**

**Networks:** Network and basic components – Logical sequencing – Rules of network construction – Critical path analysis – Probability considerations in PERT – Distinction between PERT and CPM.

**Text Book**

[1] KantiSwarup, P.K Gupta,Manmohan, Operations Research, Sultan Chand Publishers,

New Delhi, 2005.

**Unit - I**  : Chapter 2,3,4  Sections 2.1,2.2,3.1 to 3.5,3.6,4.1,4.3.

**Unit - II**  : Chapter 4,5Sections 4.4, 5.1 to 5.4, 5.7, 5.9.

**Unit - III** : Chapter 10,11  Sections 10.1 to 10.3, 10.8,10.11,10.14,11.1 to 11.4.

**Unit - IV** : Chapter 17, Sections 17.1 to 17.7.

**Unit - V**  : Chapter 21, Sections 21.1 to 21.7.

**Reference Books**

[1]Prem Kumar Guptha and D.S. Hira, Operations Research: An Introduction, S.Chand and

Co., Ltd. New Delhi,

[2] HamdyA.Taha, Operations Research (7[th]Edn.) McMillan Publishing Company, New

Delhi, 1982.

**Course Outcomes:**

At the end of the course the student will be able to
1. Understand the various techniques to solve Linear Programming Problems.
2. Acquire the knowledge about solving various optimization problems using standard methodology
3. Apply the Transportation and Assignment problem concepts in real life problems.
4. Solve the two person zero sum games based on games with and without saddle point
5. Solve the Network problems by using PERT & CPM Methods.

**Signature of the Subject Experts:**                              **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

## POOMPUHAR COLLEGE (AUTONOMOUS)
### of the Tamil Nadu HR & CE Department
### Department of Mathematics
(For those who are joining in 2019 – 2020 and after)

**Programme** : B.Sc Mathematics                    **Subject Code :**
**Semester** : VI                                   **No of hours : 5**
**Part III** : Core Paper XI                         **No of credits : 5**

**Title of the Paper: METHODS IN NUMERICAL ANALYSIS**

**Objectives:**

1. To study about various numerical techniques.
2. To solve linear equations numerically and to find interpolation by using difference formulae.

**Unit - I**

Algebraic and Transcendental equations – Finding root of the given equation (Derivation of the formula not needed) using Bisection method – Method of False Position – Newton Raphson Method – Iteration method.

**Unit - II**

Finite differences – Forward, Backward and Central differences – Their symbolic relations – Newton's forward and backward difference interpolation formulae –Interpolation with unevenly spaced intervals – Application of Lagrange's interpolating polynomial (Proof not needed) – Divided differences and their properties – Application of Newton's General Interpolating formula (Proof not needed) – Inverse interpolation.

**Unit - III**

Numerical differentiation – Numerical Integration using Trapezoidal rule & Simpson's 1/3 rule, Simpson's 3/8 rule – Weddles's rules - Theory & problems.

**Unit - IV**

Solutions to linear Systems – Gaussian elimination and Gauss Jordan method – Jacobi & Gauss Siedal iterative methods – Theory & problems.

**Unit - V**

Numerical solution of ODE – Solution by Taylor series method, Picard's method, Euler's method, Modified Euler's method, RungeKutta $2^{nd}$ and $4^{th}$ order methods (Derivation of the formula not needed).

**[In all the units the value of a root may be calculated up to 3 decimal accuracy only]**

**Text Book**

[1] S.S.Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India Pvt.

Limited, New Delhi, 2006.

**Unit - I**  : Chapter II, Sections 2.1 to 2.5

**Unit -II** : Chapter III, Sections 3.3, 3.3.1 to 3.3.4, 3.5,3.6,3.9, 3.9.1, 3.10,3.10.1,3.11.

**Unit - III**:Chapter V, Sections 5.1, 5.2, 5.4, 5.4.1 to 5.4.4.

**Unit - IV**: Chapter VI, Sections 6.3.2 to 6.3.4 , Chapter VIII, Sections 8.3.1, 8.3.2.

**Unit - V** : Chapter VII, Sections 7.1 to 7.4, 7.4.2, 7.5

**Reference Books**

[1]S.Narayanan& Others, Numerical Analysis, S.Viswanathan Publishers, 1994.

[2] A.Singaravelu, Numerical Methods, Meenachi Agency, 2000.

**Course outcomes:**
At the end of the course the student will be able to
1. acquire the basic knowledge of solving algebraic and transcendental equations.
2. examine the relation between difference operators.
3. evaluate integrals using numerical methods.
4. solve linear system of equations using iterative and non-iterative methods
5. find the numerical solution of ODE using various methods.

**Signature of the Subject Experts:**                     **Signature of the HOD**

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**          **Subject Code :**
**Semester      : VI**                                    **No of hours    : 5**
**Part III         : Core Paper XII**               **No of credits  : 5**

**Title of the Paper: COMPLEX ANALYSIS**

**Objectives:**

1. To know about complex Integral functions with Cauchy's Theorem, power series
   expansions of Taylor's and Laurant's series.
2. To understand the singularity concepts and residues, solving definite integrals using the
   residue concepts.

**Unit - I**

Functions of a complex variable – Limits – Theorems on limits – Continuous functions -Differentiability – Cauchy - Riemann equations – Analytic functions – Harmonic functions.

**Unit – II**

Elementary transformations – Bilinear transformations – Cross ratio – Fixed points of bilinear transformation – Some special bilinear transformations.

**Unit – III**

Complex integration – Definite integral – Cauchy's theorem – Cauchy's integral formula – Higher derivatives.

**Unit – IV**

Series expansions – Taylor's series – Laurent's Series – Zeroes of analytic functions - Singularities.

**Unit – V**

Residues – Cauchy's Residue theorem – Evaluation of definite integrals.

**Text Book**

[1] S.Arumugam, A.Thangapandi Isaac, andA.Somasundaram, Complex Analysis, New

Gamma Publishing House, 1999.

**Unit - I** : Chapter II, Sections 2.1 to 2.8

**Unit - II** : Chapter III, Sections 3.1 to 3.5

**Unit - III** : Chapter VI, Sections 6.1 to 6.4

**Unit - IV** : Chapter VII, Sections 7.1 to 7.4

**Unit - V** : Chapter VIII, Sections 8.1 to 8.3

**Reference Books**

[1]P.P Gupta, Kedarnath,Ramnath, Complex Variables, Meerut, Delhi.

[2] J.N.Sharma, Functions of a Complex variable, Krishna Prakasan Media (P) Ltd., 13th

Edition, 1996.

[3] T.K.ManickavasagamPillai, Complex Analysis, S.Viswanathan Publishers Pvt Ltc, 1994.

**Course outcomes:**
At the end of the course the student will be able to
1. Understand differentiation and integration of complex functions
2. Construct an analytical function using various methods.
3. Evaluate integrals using Cauchy's theorem, Cauchy's integral formula and residue theorem.
4. Determine the Taylor's and Laurent's Series expansion of complex valued functions.
5. Evaluation of definite integrals based Cauchy's Residue theorem.

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**                      **Subject Code :**
**Semester      : VI**                                                **No of hours   : 5**
**Part III          : Core Paper XIII**                        **No of credits  : 5**

**Title of the Paper: GRAPH THEORY**

**Objectives:**

1. To introduce the notion of graph theory.

2. To learn the applications of graph theory

**Unit - I**

Definition of a Graph – Application of graphs  – Finite and infinite graphs – Incidence and degree  –  Isolated vertex, pendent vertex and null graph – Isomorphism – Sub graphs – Walks, paths and circuits – Connected    and disconnected graphs – Components – Euler graphs – Operations on graphs – More  on Euler graphs – Hamiltonian paths and circuits.

**Unit - II**

Trees – Properties of trees – Pendent vertices in a tree – Distance and centres in a tree – Rooted and binary trees – Spanning trees – Fundamental circuits – Finding all spanning trees of a graph – Spanning trees in a weighted graph.

**Unit - III**

Cut sets – Properties of a cut set – All cut sets in a graph – Fundamental circuits and cut sets – Connectivity and separability.

**Unit - IV**

Vector space of a graph: Sets with one, two operations – Modular arithmetic – Galois Fields – Vectors – Vector spaces – Basis vectors of a graph – Circuit and cutest subspaces - Orthogonal vectors and spaces.

**Unit - V**

Matrix representation of a graphs: Incidence matrix – Submatrices of Incidence matrix –Circuit matrix – Fundamental circuit matrix and rank of the circuit matrix – Cut set matrix – Adjacency matrix.
**Text Book**

[1] NarsinghDeo, Graph Theory with Applications to Engineering and Computer Science,

Prentice Hall of India, New Delhi, 2005.

**Unit - I**  : Chapter I, section 1.1 to 1.5 and Chapter II, Sections 2.1, 2.2, 2.4 to 2.9

**Unit - II**: Chapter III, Sections 3.1 to3.5, 3.7 to 3.10

**Unit - III**: Chapter IV, Sections 4.1 to 4.5

**Unit - IV**: Chapter VI, Section 6.1 to 6.8

**Unit - V**: Chapter VII, Sections 7.1 to 7.4, 7.6, 7.9

**Reference Books**

[1] Dr.S.Arumugam,Dr. S. Ramachandran, Invitation to Graph Theory, Scitech Publications

   India Pvt Limited, Chennai, 2001.

[2] K.R.Parthasarathy, Basic Graph Theory, Tata McGraw Hill Publishing Company New

Delhi, 1994.

[3] G.T. John Clark, Derek Allan Holten, A First Look at Graph Theory, World Scientific

Publishing company, 1995.

**Course outcomes:**

   At the end of the course the student will be able to

   1. Acquire knowledge about graphs.
   2. Understand the applications of graphs.
   3. Know the relation between matrices and graph theory.
   4. Understand the concept of cut-sets and its applications.
   5. Getting the idea about representation of graphs by matrices.


**Signature of the Subject Experts:**                          **Signature of the HOD**


**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**          **Subject Code :**
**Semester      : V**                                        **No of hours   : 6**
**Part III        : Major Based Elective I**          **No of credits  : 5**

**Title of the Paper: MECHANICS**

**Objectives:**

1. To provide the basic knowledge of equilibrium of a particle.
2. To provide a basic knowledge of the behaviour of objects in motion.
3. To develop a working knowledge to handle practical problems.

**Unit - I**

Forces and Equilibrium: Newton's Laws of motion – Resultant of two forces on a particle – Equilibrium of a particle under three or more forces.

**Unit - II**

Forces on a rigid body – Moment – Equivalent system of forces – Parallel forces – Varignon's theorem forces along a triangle – Couples – Resultant of several coplanar forces.

**Unit - III**

Kinematics velocity: Relative velocity – Acceleration – Coplanar motion – Components of velocity and acceleration.

**Unit - IV**

Simple harmonic motion: Simple harmonic motion along a horizontal line – Simple harmonic motion along a vertical line – Motion under gravity in a resisting medium.

**Unit - V**

Projectiles:  Forces on a projectile – Maximum height reached, range, time of flight – Projectile projected on a inclined plane – Enveloping parabola or bounding parabola.

**Text Book**
[1] P.Duraipandiyan, Vector Treatment as in Mechanics, S.Chand& Co, 2008.

**Unit - I**   : Chapter II, Sections 2.1, 2.2  and  Chapter  III, Section  3.1
**Unit - II**  : Chapter IV,  Sections 4.1,  4.3  to  4.7
**Unit - III** : Chapter I, Sections 1.1 to 1.4
**Unit - IV** : Chapter XII, Sections 12.1 to 12.4
**Unit - V**  : Chapter XIII, Sections 13.1 to 13.3

**Reference Books**

[1]M.K.Venkataraman, Statics, Agasthiyar Publications, 2002.
[2] M.K. Venkataraman, Dynamics, Agasthiyar Book Dept, 1990.

**Course Outcomes:**

At the end of the course the student will be able to
1. Understand the Laws of Forces and their properties.
2. Understand Concepts of Moments and Couples, Equilibrium of Forces
3. Identify the simple harmonic motion of the particles on the universe
4. Acquire the knowledge about impulsive forces and its applications
5. Apply the concepts in real life situations

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**                          **Subject Code :**
**Semester      : V**                                               **No of hours    : 6**
**Part III       : Major Based Elective I**                 **No of credits  : 5**

**Title of the Paper: FLUID DYNAMICS**

**Objectives:**

1. To know the knowledge about fluid particles in steady and unsteady compressible and
   incompressible flows.
2. To provide the basic knowledge of two and three dimensional potential flows.
3. To apply the viscous flow in some real life situations.

**Unit - I**

 Real fluids and ideal fluids – Velocity of a fluid at a point – Streamlines and path lines; steady and unsteady flows – The velocity potential – The vorticity vector – Local and particle rates of change – The equation of continuity – Worked examples – Acceleration of a fluid – Pressure at a point in a fluid at rest – Pressure at a point in moving fluid – Conditions at a boundary of two invisid Immiscible fluids.

**Unit - II**

 Euler's equations of motions – Bernoulli's equation – Worked examples – Some flows involving axial symmetry – Some special two – dimensional flows – Some three – dimensional flows: Introduction – sources, sinks and doublets – Axi – symmetric flows; Stokes stream function.

**Unit - III**

 Some two – dimensional flows: Meaning of a two – dimensional flow – use of cylindrical polar coordinates – The stream function – The complex potential for two – dimensional, irrotational, incompressible flow – Complex velocity potentials for standard two dimensional flows – Some worked examples.

**Unit - IV**

 Stress components in real fluid – Relations between cartesian components of stress  - Translational motion of fluid element – The rate of strain quadric and principal stresses – Some further properties of the rate of strain quadric.

**Unit - V**

 The coefficient of viscosity and Laminar flow – The Navier – Stokes equations of motions of a viscous fluid.  Some solvable problems in viscous flow – steady viscous flow in tubes of uniform crass section.

**Text Book**

[1] F.Charlton, Content and Treatment as in Text Book of Fluid Dynamics, CBS Publishers

and  Distributors, New Delhi, 1985.

**Unit - I**  : Chapter II, Sections2.1 to 2.9 and

Chapter III, Sections 3.1 to 3.3

**Unit - II** :Chapter III, Sections 3.4 to 3.6, 3.9, 3.10

Chapter IV, Sections 4.1, 4.2, 4.5

**Unit - III** :Chapter V, Sections 5.1 to 5.6

**Unit - IV** : Chapter VIII, Sections 8.1to8.5

**Unit - V** : Chapter VIII, Sections 8.8 to 8.12 except 8.8.4

**Course Outcomes:**

At the end of the course the student will be able to
1. Analyse the behaviour of motion of Fluids
2. Apply of Projectile in practical problems.
3. Understand the concept of two – dimensional flow using cylindrical polar coordinates
4. Analyse the behaviour of various fluids in real life problems.
5. Know about Stokes equations of motions of a viscous fluid

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**                     **Subject Code :**
**Semester      : VI**                                               **No of hours    : 6**
**Part III         : Major Based Elective II**                **No of credits  : 5**

**Title of the Paper: PROGRAMMING IN C**

**Objectives:**

1. To learn the basic structure, operators and statements of c language.
2. To learn the decision making statements and to solve the problems based on it.
3. To learn arrays, functions and solve the problems regarding about it.

**Unit– I**

Character set – C tokens –keywords and identifiers – constants, Variables – data types – declaration of variables and storage class – assigning values to variables – defining symbolic constants – Declaring a variable as constant -  overflow and underflow  of data - Operators & expressions – evaluation of Expressions – reading & writing a character – Formated input & output.

**Unit– II**

Decision making – Use of IF, IF – ELSE & nesting of IF – ELSE statements -  ELSE – IF ladder – Switch statement – Conditional operator – GOTO statement – Decision making & looping – WHILE , DO and FOR statements.

**Unit– III**

Arrays – One dimensional , Two dimensional &Multi dimensional arrays – character arrays and strings – declaration and initialisation – arithmetic operations – comparisons – string handling functions.

**Unit– IV**

User defined functions – The forms of C functions, return values & their types – calling a function – category of functions – no arguments & no return values – arguments but no return values – arguments with return values – Nesting of functions – Recursion – Functions & arrays – The scope & life time of variables in a function.

**Unit– V**

Structures and Unions –defining a structure – declaring structure variable – operations - arrays of structures – structures within structures – structures and functions – unions – size of structure – bit fields .

**Text Book:**

[1] E. Balagurusamy, Programming in ANCI C, Tata McGraw Hill Publishing Company Ltd 1992 (2$^{nd}$ Edition)

**Unit– I**:Chapters 2.1 – 2.14, 3.1 – 3.14 & 4.1 – 4.5

**Unit– II**:Chapters 5.1 – 5.9 & 6.1 – 6.6

**Unit–III** :Chapters 7.1 – 7.7 & 8

**Unit–IV**:Chapter 9

**Unit– V**:Chapter 10.1 – 10.14

**Reference Books:**

[1] Ashok N.Kamthane "Programming with Ansi and Turbo C", Pearson Education publishers, 2002
[2] Byron Gottfried "Programming with C"(Schaum's outline series)-Tata McGrawHill publishing company -1998.

**Course Outcomes:**

At the end of the course the student will be able to
1. Acquire complete knowledge of C language Students
2. Develop logics which will help them to create programs, applications in C.
3. Understand the concept of various user defined function of C language
4. Learn the basic programming constructs they can easily switch over to any other language in future.
5. Write a C programme using the concept of structures based on user defined functions.

**Signature of the Subject Experts:**                         **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

| | |
|---|---|
| **Programme** : B.Sc Mathematics | **Subject Code :** |
| **Semester** : VI | **No of hours : 6** |
| **Part III** : Major Based Elective II | **No of credits : 5** |

**Title of the Paper: PROGRAMMING IN C++**

**Objectives:**

1. To learn class structure, member functions & data members.
2. To learn the concept of inheritance, types and example problems.
3. To learn the concepts of polymorphism, types and problems.
4. To learn files, streams and Exception handling & Templates with practical problems.

**Unit– I**

**Beginning with C++:** Applications of C++ - Simple C++ program – Structure of C++ program – Creating the source file – compiling and linking – Tokens, Expressions and Controls structures: Tokens – keywords – Identifiers – Basic data types: User defined data types – derived data types – symbolic constant – type compatibility – declaration of variables – Initialization of variables – reference variables.

**Unit–II**

**Operators in C++:** Scope resolution operator – member differencing operator – memory management operator – Manipulators – Type coast Operator – Expressions, special assignment expressions – implicit conversions – operator overloading – operator precedence – control structures. Functions in C++: Introduction – main function – Functions prototyping call by reference – inline function, default arguments – constant arguments – return by reference – function overloading – friend and virtual functions.

**Unit– III**

**Class and object:** Specifying a class – defining member functions – C structures revisited – A C++ program with class – arrays with in a class – static member function – arrays of objects – returning objects – constant member functions – pointers of members.

**Unit– IV**

**Constructors and Destructors:** Introduction – constructors – parameterized constructors – Multiple constructors in a class – copy constructors – dynamic constructor – constructing Two – dimensional arrays - Destructors – defining operator over loading – manipulation strings using operators – type conversions.

**Unit– V**

   **Inheritance:** Extending classes – introduction – defining derived class – single inheritance – making a private member inheritance – multiple, multilevel, hierarichal, hybrid inheritance – virtual base classes – abstract classes – constructors in derived classes – member classes: nesting of classes.

**Text Book:**

1. E. Balagurusamy, Object oriented programming with C++, Tata McGraw Hill publishers Ltd. New Delhi 1995.

Unit - I    : Chapter 2 (2.1 – 2.3, 2.6 – 2.8) and Chapter 3 (3.1 – 3.12)
Unit – II   : Chapter 3 (3.13 – 3.21) and Chapter 4 (4.1 – 4.10)
Unit – III  :Chapter 5 (5.1 – 5.5, 5.9, 5.12, 5.13 – 5.18)
Unit – IV  :Chapter 6 (6.1 – 6.4, 6.7 – 6.9, 6.11) and Chapter 7 (7.2, 7.6, 7.8)
Unit – V   : Chapter 8 (8.1 – 8.12)

**Reference Books:**

[1] S.K.Chadha, Object Oriented Programming using C++", AmitChadhaKalyani Publishers, New Delhi, 2001-2002.

[2] Ashok N.Kamthane, "Object Oriented Programming with Ansi and Turbo C++", Pearson Education publishers, 2003.

**Course Outcomes:**

At the end of the course the student will be able to
   1. Acquire complete knowledge of C+  language to the students.
   2. Develop logics which will help them to create programs, applications in C ++.
   3. Learn the basic programming constructs they can easily switch over to any other language in future.
   4. Write a programme using class function.
   5. Learn various types of inheritance for effective preparation of C++ programmes.

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

## POOMPUHAR COLLEGE (AUTONOMOUS)
### of the Tamil Nadu HR & CE  Department
### Department of Mathematics
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**　　　　　　　　**Subject Code :**
**Semester      : VI**　　　　　　　　　　　　　　**No of hours   : 6**
**Part III       : Major Based Elective III**　　　　　**No of credits  : 5**

**Title of the Paper: DISCRETE MATHEMATICS**

**Objectives:**

1. To study about the concept of Connectives and Inference calculus.
2. To gain knowledge about Lattices and Boolean Algebra.

**Unit - I**

　　　Connectives, statements formulae, equivalence of statement formulae, functionally complete set of connectives –NAND and NOR connectives, implication, principal conjunctive and disjunctive normal forms.

**Unit - II**

　　　Inference calculus – Derivation process – Conditional proof – Indirect method of proof – Automatic theorem proving – Predicate calculus.

**Unit - III**

　　　Partial ordering – Lattices – Properties – Lattices as algebraic system – Sub lattices – Direct product and homomorphism – Special lattices- Complemented and distributive lattices.

**Unit - IV**

　　Boolean Algebra – Sub algebra – Direct product and homomorphism – Boolean expression and Boolean functions – Re-presentation and Minimization of Boolean functions.

**Unit - V**

Combinatorics: The rules of sum and product – Permutations – Combinations – Binomial theorem – Multinomial theorem – Well ordering principle – Mathematical induction.

**Text Books**

[1] J.P Tremblay and R.Manohar, Discrete Mathematical Structures with Application to
Computer Sciences, Tata McGraw – Hill publishing company Pvt Ltd, New Delhi, 1997.
　　(Units I to IV)
[2] G.Ramesh and C.Ganesamoorthy, Discrete Mathematics,HI – Tech Publications,2003.
　　(Unit V)

**Unit - I**   : Chapter I, Sections 1.2, 1.3       [1]
**Unit -II**  : Chapter I, Sections 1.4, 1.5, 1.6   [1]
**Unit - III** : Chapter IV, Sections 4.1          [1]
**Unit - IV** : Chapter IV, Sections 4.2 to 4.4    [1]
**Unit - V**  : Chapter III, Sections 3.1 to 3.26  [2]

**Reference Books**

[1] Kenneth H . Rosen, Discrete Mathematics and its applications, Fifth edition, Tata   Mc Graw Hill Publishing Company Pvt.Ltd, New Delhi,2003.

[2] C.L Liu, Elements of Discrete Mathematics, Second Edition, MC- Graw Hill Book company, New york, 1998.

**Course Outcomes:**

At the end of the course the student will be able to
1. Create and verify the validity of the statements
2. Know and understand about partially ordered sets, Boolean algebra, lattices and their types
3. Apply Karnaugh map for simplifying the Boolean expression
4. Demonstrate the skill to construct simple mathematical proofs and to validate
5. Understand the concept of permutation and combination and its related theorems

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**                **Subject Code :**
**Semester      : VI**                                           **No of hours   : 6**
**Part III        : Major Based Elective III**            **No of credits  : 5**

**Title of the Paper: AUTOMATA THEORY**

**Objectives:**
1. To know the basic knowledge of Automata in various models.
2.  To develop the automata for various formal languages.

**Unit – I**

Theory of Automata – Definition of an automaton – Description of a finite automaton – Transition system – Properties of transition functions –Acceptability of a string by a finite automaton – Non deterministic finite state machine – The equivalence of DFA and NDFA – Mealy and Moore models – Minimisation of finite automata.

**Unit – II**

Formal language – Basic definition and examples – Chomsky classification of languages – Language and their relation – Recursive and recursively Enumerable sets – 6Operations on languages – Languages and automata.

**Unit – III**

Regular sets and regular grammars – Regular expression – Finite automaton and regular expressions – Pumping lemma for regular sets – Application of pumping lemma.

**Unit – IV**

Context – free languages – Context – free languages and derivation trees – Ambiguity in context – free grammars – Simplification of context – free grammars – Normal forms for context – free grammars – Chomsky normal form – Greibach normal form – Simple problems.

**Unit – V**

Push down Automata- Basic definitions – Acceptance by PDA – PDA and context – free languages – Parsing and Push down Automata.

**Text Book:**
[1] K.L.P.Mishra and N.Chandrasekaran, Theory of Computer Science (Automata, Languages and Computation), Prentice Hall of India Private Ltd., New Delhi.

**Unit – I**  :  Chapter 2: (Sec. 2.1 – 2.9)

**Unit – II**  : Chapter 3: (Sec.3.1 – 3.6)

**Unit – III** : Chapter 4: (Sec.4.1 – 4.4)

**Unit –IV**  :  Chapter5: (Sec.5.1– 5.4)

**Unit – V**  : Chapter 6: (Sec.6.1 – 6.4)


**Reference Books**

[1] Rani Siromoney, Formal Languages and Automata, Second edition, The Christian
    Literature Society, Madras,1984.

**Course Outcomes:**

At the end of the course the student will be able to
1. Explore the theoretical foundations of computer science from the perspective of
   formal languages and classify machines by their power to recognize languages.
2. Differentiate regular, context-free and recursively enumerable languages.
3. Gain the knowledge of basic kinds of finite automata and their capabilities.
4. Understand the concept of Turing Machines Model and to solve the related problems.
5. Define the regular sets and Pumping lemma for regular sets.

**Signature of the Subject Experts:**                    **Signature of the HOD**


**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Zoology**                                    **Subject Code :**
**Semester      : III**                                                        **No of hours   : 2**
**Part IV         : Non Major Elective - I**                       **No of credits :2**

**Title of the Paper: FUNDAMENTALS OF MATHEMATICAL STATISTICS- I**

**Course Objectives:**

1. To Learn Statistical Methods classical and tabulation of data, diagrammatic and graphic presentation of statistical data and some measures of central tendency.
2. Students should be given practice on Statistical methods so that he could apply the techniques to solve real world problems in the field of Science.

**Unit – I**

**Classification and tabulation of data:** Introduction – Data and its collection – Classification of data – Purpose, advantages and types of classification of data – Variable – Tabulation of data – Objectives, rules and types of tables – Difference between classification and tabulation – Essential parts of a statistical table – Format of a table – Sorting – Presentation of data – Frequency distribution – Bi-Variate frequency distribution.

**Unit - II**

Diagrammatic and Graphic presentation of data: Introduction – Graphical representation of statistical data –Diagramatic presentation of data – Types of diagrams – Line, Bar diagram – Two-dimensional diagrams – Pie diagram – Pictograph – Difference between diagram and graph – Types of graph – Line graph – Graph of two or more variables – Range, net balance, band graph – Histogram – Frequency polygon.

**Unit - III**

**Measures of Central Tendency:** Features of a good average – Arithmetic mean– Methods to calculate arithmetic mean(direct method only) – Median – Calculation of median – Merits, demerits and uses of median – Mode – Types of model series – Computation of mode – Merits, demerits and uses of mode – Geometric mean – Merits, demerits and uses of geometric mean – Harmonic mean – Merits, demerits and uses of harmonic mean – Relation between A.M, G.M and H.M.

**Text Book**

[1] P.N.Arora, SumeetArora and S.Arora, Comprehensive Statistical Methods, S.Chand and

Sons, New Delhi, 2007.

**Unit -I**:Chapter II, Sections 2.1 to 2.3, 2.5, 2.6, 2.8, 2.9, 2.11 to 2.20, 2.26
**Unit -II**:Chapter III, Sections 3.1 to 3.9, 3.12 to 3.18, 3.24, 3.25.
**Unit -III**:Chapter IV, Sect4.1 to 4.3, 4.5.1 to 4.5.3, 4.10 to 4.12, 4.14 to 4.17, 4.20 to 4.24

**Signature of the Subject Experts:**                          **Signature of the HOD**

**Course outcomes:**

At the end of the course the student will be able to

1. Gain the knowledge of data collection.
2. Know about the frequency distribution.
3. Getting the knowledge of various types of diagrams.
4. Understand the concept of mean, median, mode.
5. Know about merits, demerits and uses of various types of means.

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

| | | |
|---|---|---|
| **Programme** : B.Sc Zoology | | **Subject Code :** |
| **Semester** : IV | | **No of hours  : 2** |
| **Part IV** : Non Major Elective - II | | **No of credits :2** |

**Title of the Paper: FUNDAMENTALS OF MATHEMATICAL STATISTICS - II**

**Course Objectives:**

1. To Learn Statistical Methods Correlation, Regression, diagrammatic and chi – square distribution.
2. Students should be given practice on Statistical methods so that he could apply the techniques to solve real world problems in the field of Science.

**Unit - I**

   **Correlation Analysis:** Introduction - Concept of correlations – Coefficient of correlation – Types of correlation – Scatter diagram – Karl Pearson's coefficient of correlation –Spearman's rank correlation.

**Unit - II**

   **Regression Analysis:** Introduction **–** Types, Lines of regressions–Regression coefficients– Properties of regression coefficients– Properties of linear regressions – Method of least squares – Derivations of the lines of regressions directly from data, actual means and assumed means – Relation between regression and correlation analysis.

**Unit - III**

   **Chi – Square distribution:** Introduction – M.G.F of Chi – Square distribution – Applications of Chi – Square distribution: Inferences about a population variance – Goodness of fit test – Test of independence of attributes-contingency tables.

**Text Book**

[1] P.N.Arora, SumeetArora and S.Arora, Comprehensive Statistical Methods, S.Chand and

Sons, New Delhi, 2007.

**Unit - I**    : Chapter 7, Sections 7.1 to 7.3, 7.6, 7.8 to 7.10.
**Unit - II** :Chapter 8, Sections 8.1 to 8.10, 8.14.
**Unit - III** : Chapter 15, Sections 15.1, 15.3, 15.6.1, 15.6.2, 15.6.3.

**Signature of the Subject Experts:**                                       **Signature of the HOD**

**Course outcomes:**

At the end of the course the student will be able to

1. Gain the knowledge of various types of correlations.
2. Know about rank correlation.
3. Getting knowledge of regression concepts.
4. Understand the relation between regression and correlation analysis.
5. Understand the concept of Chi – Square distribution.

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**Programme   : B.Sc Mathematics**                       **Subject Code :**
**Semester     : IV**                                             **No of hours   : 2**
**Part IV        : Skill Based Elective - I**            **No of credits  : 2**

**Title of the Paper: FUNDAMENTALS OF COMPUTER**

**Course Objectives:**

After taking the course, students will be able to know the fundamental things of computer. It will help to operate the computer system in an effective manner.

**Unit – I**

    Introduction – History of Computer – Generations of computer – Classification of Computer – Advantages and disadvantages – Computer Basic Architecture .

**Unit- II**

    Basic components of computer system: Control unit – Input output unit – Memory – RAM – ROM – Memory – Types and devices– Peripherals.

**Unit – III**

    Software – System software – Application software – Hardware – Printer – Scanners – Limitations of computers – Terminology.

**Text Book**

[1] V.RameshBabu, R.Samyuktha, Computer Practice, VRB Publishers, 2002.

**Reference Books**

[1] GhoshDastidar, Chattopadhyay and Sarkar, Computers and Computation - A Beginner's

    Guide, Prentice Hall of India, 1999.

[2] Taxali, PC Software for Windows Made Simple, Tata McGraw Hill, 1999.

**Signature of the Subject Experts:**                       **Signature of the HOD**

**Course Outcomes:**

At the end of the course the student will be able to
1. Acquire complete knowledge of classification of computer.
2. Know Computer Basic Architecture
3. Understand the concept of various memories.
4. Know about software and hardware.
5. Understand the limitations of computers.

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Mathematics**          **Subject Code :**
**Semester      : V**                                    **No of hours    : 2**
**Part IV        : Skill Based Elective - II**      **No of credits  : 2**

**Title of the Paper: WINDOWS OPERATING SYSTEM**

**Course Objectives:**

After taking the course, students will be able to know the basis of windows, windows explorer and control panel.  It will help to operate in various packages of windows in an effective manner.

**Unit - I**

Windows basics: Starting windows – Windows desktop – Using the mouse – Task bar and start menu – Structure of a window – Moving a window – Maximizing, minimizing and restoring – Resizing a window – Arranging icons – Using help menu.

**Unit - II**

My computer – Windows explorer – Control panel: Changing date and time – Customising our mouse –Changing the display characteristics – Multimedia control panel – Customising sound – Fonts – Regional settings – Modems.

**Unit - III**

Working with programs: Start – Exit – Adding and removing programs – Managing files and folders – Printers – Windows accessories.

**Text Book**

[1]V.RameshBabu, R.Samyuktha, Computer Practice, VRB Publishers, 2002.

**Reference Book(s)**

[1] Silberschatz , Galvin, GAGNE "Operating System Concepts" , Sixth edition, John wile and Sons,INC, 2002.
[2] D.M.Dhamdhere, "Operating Systems", Tata McGraw Hill, 2002.

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Course Outcomes:**

At the end of the course the student will be able to
1. Acquire knowledge of windows, mouse, taskbar.
2. Know about how to use help menu.
3. Understand about windows explorer.
4. Know about control panel.
5. Understand the windows accessories.

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

| | |
|---|---|
| **Programme** : B.Sc Mathematics | **Subject Code :** |
| **Semester** : V | **No of hours   : 2** |
| **Part IV** : Skill Based Elective - III | **No of credits  : 2** |

**Title of the Paper: MS-OFFICE**

**Course Objectives:**

After taking the course, students will be able to know the basis of MS Word, MS Excel and MS Power point.  It will help to present the documents using MS Word, MS Excel and MS Power point in an effective manner.

**Unit - I**

Introduction to MS-Word - Starting Microsoft word – Parts of the word screen – menus in Ms – word – Tool bars – Working with documents – Selecting text – Moving and coping – Inserting the auto text – Finding and replacing text – Deleting text – Formatting documents – Working with tabs, tables and columns – Other tools in word – Borders and shading, Working with styles, Macros and graphics – Mail merge – Printing.

**Unit – II**

Introduction to Ms – Excel – Starting Ms – excel – Parts of a spread sheet – Working with worksheet – Formatting work sheets – Working with work workbooks – Functions and formulas – Working with excel graphics – Macros in excel – Printing a worksheet – Exit from Ms – excel.

**Unit - III**

Introduction to powerpoint–Starting powerpoint – Opening new/blank presentations – Parts of powerpoint screen – Creating slides – Setting a background layout – Saving a presentation – Closing a presentation – Opening an existing presentation – Deleting slides – Inserting objects – Adding headers and footers – Working with colors and transitions – Drawing tools – Animation objects anf slides – Slideshow creating templates – Creating built in presentation.

**Text Book**

[1] V.RameshBabu, R.Samyuktha, Computer Practice, VRB Publishers, 2002.

**Reference Books**

[1] David Rivers, Word 2003, 2004, Essential Training [MOV], Lynda.com, Inc Publications.

[2] Jill Murphy, 2003, Microsoft Office Word- Comprehensive Course - Labyrinth Publications.

[3] McGraw-Hill/Irwin - Deborah Hinkle, 2003, Microsoft Office Word 2003:

[4] A Professional Approach, Comprehensive Student Edition Specialist Student Edition.

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Course Outcomes:**

At the end of the course the student will be able to
1. Acquire knowledge of toolbars in Ms – word.
2. Know about how to work with documents.
3. Understand about working with tabs, tables and columns.
4. Understand about working with excel graphics.
5. Know to create powerpoint.

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme** : B.Sc Physics / B.Sc Chemistry     **Subject Code :**

**Semester** : I / III     **No of hours : 5**

**Part III** : Allied Course - I     **No of credits : 3**

**Title of the Paper: CALCULUS AND NUMERICAL ANALYSIS**

**Objectives:**

1. To provide the basic knowledge of differentiation and integration.

2. To solve the differentiation and integration problems.

**Unit - I**

Successive differentiation – $n^{th}$ derivative of standard functions (Derivation not needed) simple problems only – Leibnitz theorem (proof not needed) simple problems in all these.

**Unit - II**

Integrals of the form by using trigonometric substitutions

1) $\int \frac{dx}{\sqrt{a^2-x^2}}$ 2) $\int \frac{dx}{\sqrt{a^2+x^2}}$ 3) $\int \frac{dx}{\sqrt{x^2-a^2}}$ 4) $\int \frac{dx}{a^2-x^2}$ 5) $\int \frac{dx}{x^2-a^2}$ 6) $\int \frac{dx}{a^2+x^2}$

7) $\int \sqrt{a^2 - x^2}\, dx$ 8) $\int \sqrt{a^2 + x^2}\, dx$ 9) $\int \sqrt{x^2 - a^2}\, dx$

Integrals of the form

1) $\int_a^b \frac{dx}{\sqrt{(x-a)(b-x)}}$ 2) $\int_a^b \sqrt{(x-a)(b-x)}\, dx$ 3) $\int_a^b \sqrt{\frac{x-a}{b-x}}\, dx$

**Unit - III**

Evaluation of integrals of types

1) $\int \frac{dx}{ax^2 + bx + c}$ 2) $\int \frac{px+q}{ax^2 + bx + c}\, dx$ 3) $\int \sqrt{ax^2 + bx + c}\, dx$ 4) $\int \frac{dx}{\sqrt{ax^2 + bx + c}}$

5) $\int \frac{px+q}{\sqrt{ax^2 + bx + c}}\, dx$ 6) $\int \frac{dx}{a + b\cos x}$ 7) $\int \frac{dx}{a + b\sin x}$ 8) $\int \frac{dx}{a\cos x + b\sin x}$

**Unit - IV**

Reduction formula (when n is a positive integer) for

1) $\int \sin^n x\, dx$ 2) $\int_0^{\frac{\pi}{2}} \sin^n x\, dx$  3) $\int \cos^n x\, dx$  4) $\int_0^{\frac{\pi}{2}} \cos^n x\, dx$

5) Without proof $\int_0^{\frac{\pi}{2}} \sin^n x \cos^m x\, dx$ - and illustrations 6) $\int \tan^n x\, dx$ 7) $\int_0^{\frac{\pi}{4}} \tan^n x\, dx.$

**Unit - V**

Algebraic and transcendental equations – Finding a root of the given equation (Derivation of the formula not needed) using Bisection method, Newton Raphson method, Iteration method, simple problems only.

**Text Books**

[1] A. Singaravelu, Allied Mathematics – I, A.R Publications, 2002. (Units I to IV)
[2] S.S Sastry, Introductory methods of Numerical Analysis, 4th edition.(Unit V)

**Unit - I**: Chapter I, Sections 1.1 to 1.23.[1]
**Unit -II**:Chapter III, Sections 3.12 to 3.24, 3.65 to 3.67.[1]
**Unit - III**: Chapter III, Sections, 3.45 to 3.59, 3.68 to 3.73.[1]
**Unit - IV**: Chapter III, Sections, 3.86 to 3.99,  3.101 to 3.103. [1]
**Unit -V**: Chapter II ,  Sections , 2.2 , 2.4,  2.5.[2] (Problems only)

**Signature of the Subject Experts:**              **Signature of the HOD**

**Course outcomes:**

At the end of the course the student will be able to
1. Understand the properties of higher derivatives
2. Know about integrals of the form by using trigonometric substitutions
3. Understand some more types of integrals.
4. Know about reduction formulas.
5. Know to find solution for algebraic and transcendental equations.

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**Programme   : B.Sc Physics / B.Sc Chemistry**          **Subject Code :**
**Semester       : II / IV**                                                   **No of hours   : 6 / 5**
**Part III         : Allied Course - II**                                **No of credits  : 4**

**Title of the Paper: ANALYTICAL GEOMEMTRY (3D), ALGEBRA AND TRIGONOMETRY**

**Objectives:**
1. To inculcate the basics of analytical geometry three dimension.
2. To introduce the notion of various types of matrices and finding its eigen value and eigen vector.
3. To understand the basic concepts of Trigonometry

**Unit - I**
　　　　Finding the shortest distance between two skew lines and the equations of the plane containing them – Condition for Coplanarity–Equation of a sphere.

**Unit - II**
　　　Symmetric, Skew-Symmetric, Orthogonal, Hermitian, Skew-Hermitian, Unitary matrices – Rank of matrices –Solving systems of Linear Equations.(Excluding Properties)

**Unit - III**
　　　　Characteristic equation, Eigen values, Eigen vectors – Cayley Hamilton's Theorem (Proof not needed) –Simple problems only.

**Unit - IV**
　　　Expansion of $\sin n\theta, \cos n\theta, \tan n\theta$,(n being a positive integer ) – Expansion of $\sin^{n}\theta$ ,$\cos^{n}\theta$ ,$\sin^{n}\theta, \cos^{m}\theta$ in a series of sines and cosines of multiples of $\theta$ ($\theta$ – given in radians) – Expansion of $\sin \theta$, $\cos \theta$ and $\tan \theta$ in terms of powers of $\theta$ (only problems in all the above).

**Unit - V**
　　　Euler's formula for $e^{i\theta}$– Definition of Hyperbolic functions – Expansion of inverse hyperbolic functions $\sinh^{-1}x$, $\cosh^{-1}x$  and$\tanh^{-1}x$– Separation of real and imaginary parts of $\sin(x+iy)$, $\cos (x+iy)$, $\tan(x+iy)$, $\sinh(x+iy)$, $\cosh(x+iy)$, $\tanh(x+iy)$.

**Text Book**
[1] A. Singaravelu, Allied Mathematics (Paper – II), A.R Publications, 2003.

**Unit - I**: Chapter III, Sections 3.57 to 3.65, 3.68 to 3.75.
**Unit -II** : Chapter II, Sections 2.1 to 2.40  (Excluding Properties)
**Unit -III**: Chapter II, Sections 2.51 to 2.66, 2.75 to 2.80.
**Unit - IV**: Chapter IV, Sections 4.7 to 4.32.( Only Problems)
**Unit-V**: Chapter V, Sections 5.1 to 5.17.

**Signature of the Subject Experts:**                              **Signature of the HOD**

**Course outcomes:**

At the end of the course the student will be able to

1. Illustrate the knowledge of geometry and its applications
2. Formulate the equations of line, plane and sphere.
3. Understand the concept of matrices.
4. Understand the concept of trigonometry.
5. Perceive the difference between trigonometric function and hyperbolic functions

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

**Programme   : B.Sc Physics / B.Sc Chemistry**          **Subject Code :**
**Semester      : II / IV**                                                    **No of hours   : 5**
**Part III         : Allied Course - III**                                 **No of credits  : 3**

**Title of the Paper: ODE, NUMERICAL AND VECTOR CALCULUS**

**Objectives:**

1. To provide the basic knowledge of vector differentiation and vector integration.

2. To solve the vector differentiation and vector integration problems.

**Unit - I**

Linear equations with constant coefficients – Finding particular integrals in the cases of $e^{kx}, \sin(kx), \cos(kx), x^k$ (where $k$ is a constant)and $e^{kx}f(x)$ where $f(x)$ is any function of $x$ (only problems in all the above – No proof needed for any formula).

**Unit - II**

Numerical Integration using Trapezoidal rule & Simpson's   First and second rules – Simple problems.(Proofs not needed)

**Unit - III**

Solutions to linear systems – Gaussian Elimination Method – Jacobi & Gauss siedal Method – Simple problems. (proofs not needed).

**Unit - IV**

Scalar and Vector, Vector differentiation – velocity & acceleration Vectors – Gradient and its properties - directional derivative –  unit normal vector – scalar Potential.

**Unit - V**

Divergence , Curl – Solinoidal and irrotational vectors -   Double operators- properties connecting gradient, divergence, and curl of a vector(simple properties only).

**Text Books**
[1] A.Singaravelu,Allied Mathematics (Paper III) ,A.R Publications,2003. (Unit I)
[2]S.S Sastry, Introductory methods of Numerical Analysis, 4th edition.  (Units II, III)
[3] A.Singaravelu,Allied Mathematics (Paper I) ,A.R Publications,2002. (Units IV, V)

**Unit - I**: Chapter I, Sections 1.41 to 1.67      [1]
**Unit -II**: Chapter V, Sections 5.4.1 to 5.4.3 [2]
**Unit -III**: Chapter VI Section 6.3.2 and Chapter VIII, sections 8.3.1, 8.3.2.[2]

**Unit -IV**: Chapter V, Sections5.1 to 5.10, 5.20  to 5.36[3]
**Unit - V**: Chapter V, Sections 5.37 to 5.55   [3] (Simple Properties only)

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Course outcomes:**

At the end of the course the student will be able to

1. Know the knowledge of solving the various differential equations
2. Evaluate the different types of integrals.
3. Understand the concept of applying iterative methods.
4. Understand the concept of vector differentiation.
5. Find the application of vector integration.

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**

**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

| | |
|---|---|
| **Programme   : B.C.A** | **Subject Code :** |
| **Semester      : I** | **No of hours   : 5** |
| **Part III        : Allied Course - I** | **No of credits  : 3** |

**Title of the Paper: NUMERICAL ANALYSIS**

**Objectives:**

1. To study about various numerical techniques.
2. To solve linear equations numerically and to find interpolation by using difference
   formulae.

**Unit - I**

   Algebraic and transcendental equations – Finding a root of the given equation
(Derivation of the formula not needed) using Bisection method, Newton Rapson method.

**Unit - II**

   Finite differences forward – Backward differences – Newton's forward and backward
difference interpolation Formulae. Lagrange's interpolating polynomial. (Proof not needed);

**Unit - III**

   Numerical differentiation – Numerical Integration using Trapezoidal rule &
Simpson's   First and second rules – Simple problems.

**Unit - IV**

   Solutions to linear systems – Gaussian Elimination Method – Jacobi and Gauss Siedal
methods – Simple problems.

**Unit - V**

   Numerical solution of O.D.E: Solution by Taylor series method, Euler's method,
Runge-kutta $2^{nd}$ order method.

**Text Book**

[1] S.S Sastry, Introductory methods of Numerical Analysis, Prentice Hall of India Pvt Ltd,
   2005.

**Unit-I**: Chapter 2, Sections 2.1,2.2,2.5.
**Unit -II**: Chapter 3, Sections 3.3,3.3.1,3.3.2,3.6,3.9.1.
**Unit - III**: Chapter 5 – Sections 5.4,5.4.1,5.4.2,5.4.3
**Unit - IV**: Chapter 6, Section  6.3.2 and Chapter 8, Sections8.3.1,8.3.2.
**Unit - V** : Chapter 7 – Sections 7.2,7.4,7.5.

**Reference Books**

[1]S.Narayanan& Others, Numerical Analysis, S.Viswanathan Publishers, 1994.
[2]A.Singaravelu, Numerical Methods, Meenachi Agency, June 2000.

**Signature of the Subject Experts:**                    **Signature of the HOD**

**Course outcomes:**

At the end of the course the student will be able to

1. Acquire the basic knowledge of solving algebraic and transcendental equations.
2. Examine the relation between difference operators.
3. Evaluate integrals using numerical methods.
4. Solve linear system of equations using iterative and non-iterative methods
5. Find the numerical solution of ODE using various methods.

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE  Department**
**Department of  Mathematics**
(For those who are joining in 2019 – 2020 and after)

| | |
|---|---|
| **Programme   : B.C.A** | **Subject Code :** |
| **Semester      : II** | **No of hours   : 5** |
| **Part III        : Allied Course - II** | **No of credits  : 3** |

**Title of the Paper: OPERATIONS RESEARCH**

**Objectives:**

1. To introduce the various techniques of Operations Research.
2. To make the students solve real life problems in Business and Management

**UNIT – I**

**Operations Research:** Introduction – Basic concepts Linear programming problem-Mathematical Formulation of the problem – Graphical solution method.

**UNIT – II**

**Simplex method:** Introduction – canonical and standard forms of L.P.P.– the Simplex procedure – BIG – M Method only. (simple problems).

**UNIT – III**

**Sequencing problems:** Processing of n jobs through two machines – Processing of n jobs through 3 machines – Processing of two jobs through m machines.

**UNIT – IV**

**Transportation problem:** Introduction _General transportation problem – the ptransportation table –solution of a transportation problem – finding an initial Basic feasible solution (NWC, LCM, VAM) – Degeneracy in transportation problem – Transportation Algorithm (modi method) – unbalanced Transportation problem .

**UNIT – V**

**Network scheduling by PERT /CPM:** Introduction _ network and Basic components – logical sequencing rules of network construction – critical path analysis – probability considerations in PERT- Distinction between PERT and CPM.

**Text Book**

[1] KantiSwarup, P.K Gupta andMan Mohan, Operations Research, Sultan Chand and sons,

New Delhi, 2005.

Unit I: Chapter 2, Chapter 3, Sections 3.1 to 3.3

Unit II: Chapter 3, Sectios 3.4, 3.5, Chapter 4, Sections 4.1, 4.3, 4.4 (Big – M method only).
Unit III: Chapter 12, Sections 12.1 to 12.6.
Unit IV: Chapter 10, Sections 10.9 to 10.12, 10.14.
Unit V : Chapter 21, Sections 21.1 to 21.7.

**Reference Books**

[1]Prem Kumar Guptha and D.S. Hira, Operations Research: An Introduction, S.Chand and Co., Ltd. New Delhi,

[2] HamdyA.Taha, Operations Research (7thEdn.) McMillan Publishing Company, New Delhi, 1982.

**Signature of the Subject Experts:**                          **Signature of the HOD**

**Course Outcomes:**

At the end of the course the student will be able to
1. Understand the various techniques to solve Linear Programming Problems.
2. Acquire the knowledge about solving various optimization problems using standard methodology
3. Know about sequencing problems.
4. Apply the Transportation and Assignment problem concepts in real life problems.
5. Solve the Network problems by using PERT & CPM Methods.

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**Programme** : B.A.ECONOMICS                    **Subject Code :**
**Semester** : III                                       **No of hours** : 5
**Part III** : Allied Course - I                    **No of credits** : 3

**Title of the Paper: STATISTICAL METHODS – I**

**Objectives:**

1. To inculcate the basics of Statistics.
2. To understand the concepts of various measures for calculating central value.

**Unit - I**

Introduction:Statistics – Nature and Scope – its relation with other sciences – Limitation – collection of data – Primary and secondary sources.

**Unit - II**

Sampling:Essentials of sampling – probability and Non – probability sampling methods – Merits and limitations of sampling.

**Unit - III**

Types of Diagram – bar and pie diagrams – Pictographs – graphs Histogram – Frequency polygon-problems – limitations of diagrams and graphs.

**Unit - IV**

Measures of Central Value:Arithmetic mean for raw data and frequency distribution – Limitations – Mode and its limitations – Median and its limitations. (mean, median and mode problems only)

**Unit - V**

Quartile – properties of Geometric mean – Harmonic mean – simple problems.(Quartile, geometric mean and harmonic mean problems only)

**Text Book**
[1] P.R Vittal,Business Mathematics and Statistics,Margham publications, Chennai,2008.

**Unit - I**: Part Two Chapter I and Chapter II
**Unit - II**: Part Two Chapter XVIII
**Unit - III**: Part Two Chapter IV
**Unit - IV**: Part Two Chapter V( Mean,median and mode problems only)
**Unit - V**: Part Two Chapter V (Quartile,geometric mean and harmonic mean only)

**Reference Books**

[1] Gupta, S.C, Fundamentals of Applied Statistics, S.Chand& Sons, New Delhi, 1993.

[2] Gupta, S.C, Statistical Methods, Sultan Chand, New Delhi, 2002.

[3] Speigal, M.R, Theory and Problems of Statistics, McGraw Hill Book Co., London, 1992.

[4] Chou, Y, Statistics Analysis, Holt, Reinhart and Winston, New York, 1975.

**Signature of the Subject Experts:**                          **Signature of the HOD**

**Course outcomes:**

At the end of the course the student will be able to

1. Gain the knowledge of data collection.
2. Know about sampling.
3. Getting the knowledge of various types of diagrams.
4. Understand the concept of mean, median, mode.
5. Know about merits, demerits and uses of various types of means.

**Outcome Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1 | 3 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**

**Department of  Mathematics**

(For those who are joining in 2019 – 2020 and after)


**Programme   : B.A.ECONOMICS**                    **Subject Code :**
**Semester      : IV**                                              **No of hours   : 5**
**Part III        : Allied Course - II**                       **No of credits  : 4**


**Title of the Paper:STATISTICS PRACTICAL**


1.Tabulation of data

2. Diagrammatic representation

3. Graphical representation

4. Mean

5. Median

6. Mode

7. Correlation

8. Regression

9. Mean Deviation

10. Standard Deviation

        A record of lab work should be maintained and submitted at the time of the practical examinations.



**Signature of the Subject Experts:**                          **Signature of the HOD**

**POOMPUHAR COLLEGE (AUTONOMOUS)**
**of the Tamil Nadu HR & CE Department**
**Department of Mathematics**
(For those who are joining in 2019 – 2020 and after)

| | |
|---|---|
| **Programme : B.A.ECONOMICS** | **Subject Code :** |
| **Semester : IV** | **No of hours : 5** |
| **Part III : Allied Course - III** | **No of credits : 3** |

**Title of the Paper: STATISTICAL METHODS – II**

**Objectives:**

1. To inculcate the basics of Statistics.
2. To understand the concepts of correlation, regression and index numbers.

**UNIT - I**

     **Tabulation of data:** Frequency distribution – Its formation – Types of tables.

**UNIT - II**

     **Correlation Analysis:** Types of correlations – Scatter diagram – Pearson's coefficient of correlations – Direct Method – Spearman's rank correlation.(Problems only)

**UNIT - III**

     **Regression Analysis:** Difference between correlation and regression analysis – Two Regression lines – Regression coefficients.

**UNIT - IV**

     **Index Numbers:** Uses of Index numbers – Problems in the construction of index numbers – Quantity index numbers – Laspeyers, Passche formula. (Problems only)

**UNIT - V**

     **Interpolation:** Newton's Forward and backward interpolation formula – Lagrange's interpolation formula – Simple problems only.

**Text Book**

[1] P.R Vittal,Business Mathematics and Statistics,Margham publications, Chennai,2008.
[2] S.S Sastry, Introductory methods of Numerical Analysis, Prentice Hall of India Pvt Ltd, 2005.

**Unit - I**: Part Two Chapter III [1]
**Unit - II**: Part Two Chapter VIII ( Problems only) [1]
**Unit - III**: Part Two Chapter IX
**Unit - IV**: Part Two Chapter XIII (Problems only) [1]
**Unit - V** : Chapter III Sections 3.6, 3.9.1 (Problems only) [2]

**Reference Books**

[1] Gupta, S.C, Fundamentals of Applied Statistics, S.Chand& Sons, New Delhi, 1993.

[2] Gupta, S.C, Statistical Methods, Sultan Chand, New Delhi, 2002.

[3] Speigal, M.R, Theory and Problems of Statistics, McGraw Hill Book Co., London, 1992.

[4] R.S.N.Pillai, V.Bagavathi, Statistics, S,Chand and Company Ltd, 1993.

**Signature of the Subject Experts:**                          **Signature of the HOD**

**Course outcomes:**

At the end of the course the student will be able to

1. Gain the knowledge of tabulation of data.
2. Know about the correlation.
3. Getting the knowledge of regression.
4. Understand the uses of index numbers.
5. Know about the relation between difference operators.

**Outcome Mapping:**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| **CO1** | 3 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 3 | 2 |

**1-Low  2-Moderate 3- High**