

# NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

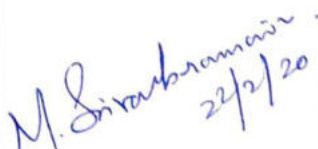
|     |                   |                                                            |          |      |
|-----|-------------------|------------------------------------------------------------|----------|------|
| 172 | B.A.Economics     | NME: Information Management                                | 20UEO4N3 | 2020 |
| 173 | B.A.Economics     | Core III: Human Resource Management                        | 20UEO510 | 2020 |
| 174 | B.A.Economics     | Core III: Investment Policies and Programmes               | 20UEO511 | 2020 |
| 175 | B.A.Economics     | Core III Elective: Statistical Methods - I                 | 20UEO5E1 | 2020 |
| 176 | B.A.Economics     | Core III Elective: Information Management                  | 20UEO5E2 | 2020 |
| 177 | B.A.Economics     | Core III: Window Based Office Automation and Tally         | 20UEO512 | 2020 |
| 178 | B.A.Economics     | Core III: Economics of Transport                           | 20UEO616 | 2020 |
| 179 | B.A.Economics     | Core III Elective: Statistical Methods - II                | 20UEO6E3 | 2020 |
| 180 | B.A.Economics     | Core III Elective : Principles of Management               | 20UEO5E4 | 2020 |
| 181 | B.A.Economics     | Core III: Tourism Economics                                | 20UEO6E5 | 2020 |
| 182 | B.A.Economics     | Core III Elective: Women and Economy                       | 20UEO6E6 | 2020 |
| 183 | B.A.Economics     | Skill Based: Advertising and Sales Promotion               | 20UEO6S3 | 2020 |
| 184 | B.Sc. Mathematics | Core I: Classical Algebra                                  | 20UMS101 | 2020 |
| 185 | B.Sc. Mathematics | Core II: Calculus                                          | 20UMS102 | 2020 |
| 186 | B.Sc. Mathematics | Allied I: Mathematical Statistics-I                        | 20UMS1A1 | 2020 |
| 187 | B.Sc. Mathematics | Core III: Trigonometry, Vector Calculus and Fourier Series | 20UMS203 | 2020 |
| 188 | B.Sc. Mathematics | Core IV: Analytical Geometry                               | 20UMS204 | 2020 |
| 189 | B.Sc. Mathematics | Allied II: Mathematical Statistics-II                      | 20UMS2A2 | 2020 |
| 190 | B.Sc. Mathematics | Core VI: Numerical Techniques                              | 20UMS306 | 2020 |
| 191 | B.Sc. Mathematics | NME: Quantitative Aptitude -I                              | 20UMS3N1 | 2020 |
| 192 | B.Sc. Mathematics | Core VIII: Operations Research -I                          | 20UMS408 | 2020 |
| 193 | B.Sc. Mathematics | NME: Quantitative Aptitude -II                             | 20UMS4N3 | 2020 |
| 194 | B.Sc. Mathematics | Core XI: Operations Research-II                            | 20UMS511 | 2020 |
| 195 | B.Sc. Physics     | Core VIII: Optics & Spectroscopy                           | 20UPS508 | 2020 |
| 196 | B.Sc. Physics     | Core VII : Mechanics                                       | 20UPS507 | 2020 |
| 197 | B.Sc. Physics     | Summer Internship or Vocational training/ Project          | 20UPS511 | 2020 |

BoS Minutes  
Highlighted



# Board of Studies in Mathematics UG(AIDED and SF)& PG

SATURDAY: 22.02.2020 10.00 A.M.

| S.No. | Name of the members                                                                                                                                                                                                                                                                               | Signature                                                                                          |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1     | Dr. M. Sheik John<br>(Chairman)                                                                                                                                                                                                                                                                   | <br>22/02/2020   |
| 2     | Dr. S. Manikandan<br>Associate Professor<br>Department of Mathematics<br>M. S. University<br>Tirunalveli - 627 012.<br>(University Nominee)                                                                                                                                                       | — ABSENT —                                                                                         |
| 3     | Mrs. S. Murugambigai<br>Associate Professor and Head<br>Department of Mathematics<br>Government Arts College (Autonomous)<br>Karur - 639 005.<br>Mob. No : 7010559899<br>E Mail id : <a href="mailto:jbmuruga@gmail.com">jbmuruga@gmail.com</a><br>(Subject Expert(UG))                           | <br>22/2/2020    |
| 4     | Dr. R. Srikanth<br>Professor and Dean<br>Department of Mathematics<br>School of Humanities & Sciences<br>SASTRA Deemed University<br>Thanjavur - 613 401.<br>Mob. No : 8903833658<br>E Mail id : <a href="mailto:srikanth@maths.sastra.edu">srikanth@maths.sastra.edu</a><br>(Subject Expert(PG)) | <br>22/02/2020  |
| 5     | Mrs. P. Pooraneeswari<br>Managing Director<br>Climate Smart Technologies<br>25/1 A Block, LIG colony II<br>Palladam Road Extension<br>Pollachi, Coimbatore - 642 002.<br>Mob. No : 8344747884<br>(Industrialist)                                                                                  | <br>22/02/2020 |
| 6     | Dr. M. Sivasubramanian<br>Assistant Professor<br>Department of Mathematics<br>Government Arts College<br>Udumalpet - 642 126.<br>Mob. No : 9095542186<br>(Alumni)                                                                                                                                 | <br>22/2/20    |

The board approves the following resolutions with effect from 2020-2021 for B.Sc Programme

\* Based on the new higher secondary state board syllabus atmost 50% of papers in the B.Sc Programme (SEMESTER I & II) have been revised. The contents in the following papers are revised

1. Classical Algebra

2. Calculus

3. Mathematical Statistics I & II

4. Trigonometry, Vector Calculus and Fourier Series

5. Analytical Geometry

\* Included Karanagh maps in the elective paper - Discrete Mathematics

\* Around 30% of the syllabus in the core papers OR-I and OR-II are modified.

\* NME - Quantitative Aptitude I & II shuffled and strengthened with real time problems based on GRE, TOEFL, CAT, MAT, CSIRNET etc.

\* Reference books for NME - Astronomy I & II are included.

The following suggestions were recorded for the future updation:

\* To implement Bharathiar University syllabus for both Allied Mathematics for Physics I & II, Allied Mathematics for Chemistry I & II as strongly recommended by the subject experts

\* To enable the question setters, indications for theory questions (percentage wise) shall be detailed for core papers OR-I & OR-II

\* Programming in PYTHON, R-Software, MAPLE shall be included.

M. Srinivasan 22/02/2020

S. M. J. 22/2/2020

R.M. 24/02/2020

22/02/2020

|    |                          |                                   |
|----|--------------------------|-----------------------------------|
| 7  | Dr. V. Inthumathi        | ML                                |
| 8  | Dr. J. Jayasudha         | J. Jayasudha<br>22/2/20           |
| 9  | Dr. R. Santhi            | ML                                |
| 10 | Dr. V. Chitra            | V. Chitra<br>22/2/2020            |
| 11 | Dr. S. Sivasankar        | S. Sivasankar<br>22/2/2020        |
| 12 | Mr. P. Siravanan         |                                   |
| 13 | Dr. S. Kaleeswari        | S. Kaleeswari<br>22/2/2020        |
| 14 | Ms. M. Amsaveni          | M. Amsaveni<br>22/2/2020          |
| 15 | Ms. A. Gnanasoundari     | A. Gnanasoundari<br>22/2/2020     |
| 16 | Ms. G. Anandhi           |                                   |
| 17 | Ms. N. Udayarani         | N. Udayarani                      |
| 18 | Mr. S. Earnest Rajadurai | S. Earnest Rajadurai<br>22/2/2020 |
| 19 | Ms. N. Nithya            | N. Nithya<br>22/2/2020            |
| 20 | Mr. V. Sree Ramakrishnan | V. Sree Ramakrishnan<br>22/2/2020 |

- \* To include
  1. 3D-Printing
  2. Android App Development
 as value added programmes for B.Sc
- \* To incorporate open electives
- \* Number theory based paper - "Mathematics for cybersecurity" shall be considered.

With slight modifications the board approves the syllabi and Scheme of examinations for M.Sc Programme from the academic year 2020-2021

M. Sivarubraman 22/2

T. T. P. 22/2/2020

22/2/2020

22/2/2020

22/2/2020

M. A. 22/02/2020

A. C. 22/02/2020

N. 22/02/2020

22/02/2020

22/02/2020

**N.G.M COLLEGE - CURRICULUM DEVELOPMENT CELL**  
**B. Sc. MATHEMATICS SCHEME OF EXAMINATION FOR (2020 – 2023 Batch)**  
**CHOICE BASED CREDIT SYSTEM & OBES**

| Part No.      | Subject Code | Subject Title                                              | Lecture + Practical Hours/Week | Duration of Exam Hrs | Max. Marks |     |       | Credit points |
|---------------|--------------|------------------------------------------------------------|--------------------------------|----------------------|------------|-----|-------|---------------|
|               |              |                                                            |                                |                      | CIA        | ESE | TOTAL |               |
| SEMESTER – I  |              |                                                            |                                |                      |            |     |       |               |
| I             | 20UTL101     | Tamil / Hindi Paper-I                                      | 6                              | 3                    | 25         | 75  | 100   | 3             |
| II            | 20UEN101     | English Paper-I                                            | 5                              | 3                    | 25         | 75  | 100   | 3             |
| III           | 20UMS101     | CORE I: Classical Algebra                                  | 5                              | 3                    | 25         | 75  | 100   | 4             |
| III           | 20UMS102     | CORE II: Calculus                                          | 6                              | 3                    | 25         | 75  | 100   | 5             |
| III           | 20UMS1A1     | ALLIED I:Mathematical Statistics I                         | 6                              | 3                    | 25         | 75  | 100   | 5             |
| IV            | 20UHR101     | Human Rights in India                                      | 1                              | 2                    | --         | 50  | 50    | 2             |
| IV            | 20UEC101     | Human Excellence: Personal values and sky yoga practice -I | 1                              | 2                    | -          | 50  | 50    | 1             |
| V             | –            | Extension Activities (See Annexure -I)                     | --                             | --                   | --         | --  | --    | --            |
|               |              | Total                                                      |                                |                      |            |     | 600   | 23            |
| SEMESTER – II |              |                                                            |                                |                      |            |     |       |               |
| I             | 20UTL202     | Tamil / Hindi Paper- II                                    | 6                              | 3                    | 25         | 75  | 100   | 3             |
| II            | 20UEN202     | English Paper –II                                          | 5                              | 3                    | 25         | 75  | 100   | 3             |
| III           | 20UMS203     | CORE III: Trigonometry ,Vector Calculus and Fourier Series | 5                              | 3                    | 25         | 75  | 100   | 4             |
| III           | 20UMS204     | CORE IV: Analytical Geometry                               | 5                              | 3                    | 25         | 75  | 100   | 4             |
| III           | 20UMS2A2     | ALLIEDII:Mathematical Statistics II                        | 6                              | 3                    | 25         | 75  | 100   | 5             |
| IV            | 20EVS201     | Environmental Studies                                      | 2                              | 3                    | --         | 50  | 50    | 2             |
| IV            | 20HEC202     | Human Excellence: Family values and sky yoga practice-II   | 1                              | 2                    | -          | 50  | 50    | 1             |
| V             | –            | Extension Activities (See Annexure - I)                    | --                             | --                   | --         | --  | --    | --            |
|               |              | Total                                                      |                                |                      |            |     | 600   | 22            |

| SEMESTER – III |                       |                                                                 |    |    |    |    |     |    |
|----------------|-----------------------|-----------------------------------------------------------------|----|----|----|----|-----|----|
| I              | 20UTL303              | Tamil / Hindi Paper- III                                        | 5  | 3  | 25 | 75 | 100 | 3  |
| II             | 20UEN303              | English Paper –III                                              | 6  | 3  | 25 | 75 | 100 | 3  |
| III            | 20UMS305              | CORE V: Dynamics                                                | 5  | 3  | 25 | 75 | 100 | 4  |
| III            | 20UMS306              | CORE VI: Numerical Techniques                                   | 4  | 3  | 25 | 75 | 100 | 3  |
| III            | 20UMS3A1              | ALLIED III: Physics for Mathematics and Chemistry-I             | 8  | 3  | 25 | 75 | 100 | 4  |
| IV             | 20UMS3N1/<br>20UMS3N2 | NME - Quantitative Aptitude - I /<br>Astronomy- I               | 1  | 2  | -- | 50 | 50  | 2  |
| IV             | 20HEC303              | Human Excellence: Professional values and sky yoga practice-III | 1  | 2  | -  | 50 | 50  | 1  |
| V              | –                     | Extension Activities<br>(See Annexure -I)                       | -- | -- | -- | -- | --  | -- |
| Total          |                       |                                                                 |    |    |    |    | 600 | 20 |

| SEMESTER – IV |                       |                                                             |    |    |    |    |     |    |
|---------------|-----------------------|-------------------------------------------------------------|----|----|----|----|-----|----|
| I             | 20UTL404              | Tamil / Hindi Paper - IV                                    | 5  | 3  | 25 | 75 | 100 | 3  |
| II            | 20UEN404              | English Paper - IV                                          | 6  | 3  | 25 | 75 | 100 | 3  |
| III           | 20UMS407              | CORE VII: Statics                                           | 4  | 3  | 25 | 75 | 100 | 4  |
| III           | 20UMS408              | CORE VIII: Operation Research-I                             | 5  | 3  | 25 | 75 | 100 | 4  |
| III           | 20UMS4A2              | ALLIED IV: -Physics for Mathematics and Chemistry-II        | 8  | 3  | 25 | 75 | 100 | 4  |
| III           | 20UMS4A3              | ALLIED PRACTICAL: Physics lab for Mathematics and Chemistry | -- | 3  | 40 | 60 | 100 | 2  |
| IV            | 20UMS4N3/<br>20UMS4N4 | NME - Quantitative Aptitude - II/<br>Astronomy -II          | 1  | 2  | -- | 50 | 50  | 2  |
| IV            | 20HEC404              | Human Excellence: Social values and sky yoga practice-IV    | 1  | 2  | -- | 50 | 50  | 1  |
| V             | –                     | Extension Activities<br>(See Annexure -I)                   | -- | -- | -- | 50 | 50  | 1  |
| Total         |                       |                                                             |    |    |    |    | 750 | 24 |

| SEMESTER-V |                       |                                                                               |    |   |    |    |            |           |
|------------|-----------------------|-------------------------------------------------------------------------------|----|---|----|----|------------|-----------|
| III        | 20UMS509              | CORE IX: Modern Algebra                                                       | 6  | 3 | 25 | 75 | 100        | 4         |
| III        | 20UMS510              | CORE X: Real Analysis-I                                                       | 6  | 3 | 25 | 75 | 100        | 4         |
| III        | 20UMS511              | CORE XI: Operation Research-II                                                | 5  | 3 | 25 | 75 | 100        | 4         |
| III        | 20UMS512              | CORE XII: Theory of Numbers                                                   | 5  | 3 | 25 | 75 | 100        | 4         |
| III        | 20UMS5E1              | ELECTIVE-I- Programming in C                                                  | 4  | 3 | 25 | 75 | 100        | 3         |
| III        | 20UMS5E2              | ELECTIVE PRACTICAL -<br>Programming lab in C                                  | 2  | 3 | 20 | 30 | 50         | 2         |
| IV         | 20UMS5S1/<br>20UMS5S2 | SBE: Network and Information<br>Security/<br>Cyber security – Ethical Hacking | 1  | 2 | -- | 50 | 50         | 2         |
| IV         | 20GKL501              | General Knowledge and General<br>Awareness                                    | SS | 2 | -- | 50 | 50         | 2         |
| IV         | 20HEC505              | Human Excellence: National values<br>and sky yoga practice :V                 | 1  | 2 | -- | 50 | 50         | 1         |
|            |                       | <b>Total</b>                                                                  |    |   |    |    | <b>700</b> | <b>26</b> |

| SEMESTER – VI |                       |                                                             |   |   |    |    |             |            |
|---------------|-----------------------|-------------------------------------------------------------|---|---|----|----|-------------|------------|
| III           | 20UMS613              | CORE XIII: Linear Algebra                                   | 6 | 3 | 25 | 75 | 100         | 4          |
| III           | 20UMS614              | CORE XIV: Real Analysis-II                                  | 6 | 3 | 25 | 75 | 100         | 4          |
| III           | 20UMS615              | CORE XV: Complex Analysis                                   | 5 | 3 | 25 | 75 | 100         | 4          |
| III           | 20UMS6E3              | ELECTIVE-II- Discrete<br>Mathematics                        | 5 | 3 | 25 | 75 | 100         | 5          |
| III           | 20UMS6E4              | ELECTIVEIII- OOP with C++                                   | 4 | 3 | 25 | 75 | 100         | 3          |
| III           | 20UMS6E5              | ELECTIVE PRACTICAL-<br>Programming lab in OOP with C++      | 2 | 3 | 20 | 30 | 50          | 2          |
| IV            | 20UMS6S3/<br>20UMS6S4 | SBE - Mathematics for Finance/<br>Actuarial Mathematics     | 1 | 2 | -- | 50 | 50          | 2          |
| IV            | 20HEC606              | Human Excellence: Global values<br>and sky yoga practice-IV | 1 | 2 | -- | 50 | 50          | 1          |
|               |                       | <b>Total</b>                                                |   |   |    |    | <b>650</b>  | <b>25</b>  |
|               |                       | <b>Grand Total</b>                                          |   |   |    |    | <b>3900</b> | <b>140</b> |

  
Head of the Department

**Dr. V. Inthumathi, Ph.D.,**  
Associate Professor & Head  
Department of Mathematics  
N.G.M College, Pollachi - 642 001.

  
Principal

**Dr. R. MANICKA CHEZIAN M.Sc., M.S., Ph.D.,**  
PRINCIPAL i/c  
Nallamuthu Gounder Mahalingam College  
Pollachi - 642 001, Coimbatore District.

|                        |          |                          |                  |           |
|------------------------|----------|--------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b> | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS101 | <b>Title</b>             | <b>Batch :</b>   | 2020-2023 |
|                        |          | CLASSICAL ALGEBRA        | <b>Semester</b>  | I         |
| <b>Hrs/Week</b>        | 5        |                          | <b>Credits :</b> | 4         |

### Course Objective

This course provides the learners a wide spectrum of basic mathematical concepts including summation of series, roots of an equation and matrices.

### Course Outcomes (CO)

On completion of this course, the students will be able to

|    |     |                                                                                     |
|----|-----|-------------------------------------------------------------------------------------|
| K1 | CO1 | understand the basic concepts of algebra and matrices.                              |
| K2 | CO2 | formulate and solve the mathematical equations and analyze the nature of the roots. |
| K3 | CO3 | effectively apply the Binomial theorem, Exponential theorem to summation of series. |
| K4 | CO4 | evaluate the system of equations using matrices.                                    |

#### Unit – I

**Convergency and Divergency of Series:** Some general theorems concerning infinite series – Series of positive terms – Comparison tests – Cauchy’s condensation test – D’Alembert’s Ratio test – Cauchy’s Root test – Raabe’s test.

**Text Book 1: Chapter 2: Sections: 11-20**

[14 Hours]

#### Unit -II

**Binomial theorem:** Application of Binomial theorem to summation of series.

**Exponential and logarithmic series:** The Exponential theorem – Summation - The logarithmic series - Modification of the Logarithmic series - Series which can be summed up by the logarithmic series.

**Summation of series:** Application of partial fractions.

**Text Book 1: Chapter 3: Section: 10.**

**Chapter 4: Sections: 2, 3, 3.1, 5 - 7, 9, 9.1 (No derivations).**

**Chapter 5: Sections: 2.1, 3.1, 3.2.**

[13 Hours]

#### Unit -III

**Theory of equations:** Symmetric function of roots- Newton’s Theorem on the sum of powers of the roots – To increase or decrease the roots of a given equation by a given quantity – Form of the quotient and remainder when a polynomial is divided by a binomial – *Removal of terms (Self study).*

**Text Book 1: Chapter 6: Sections: 12, 14 17-19**

[13 Hours]

#### Unit -IV

**Theory of equations:** Multiple roots – Strum’s theorem – Solutions of numerical equations – Newton’s method of divisors – Horner’s Method.

**Text Book 1: Chapter 6: Sections: 26, 27, 28.1-28.3, 29.4, 30**

[12 Hours]

## Unit -V

**Fundamental Concepts:** Nilpotent – Idempotent – Unitary – Orthogonal Matrices – Related Problems.

**Characteristic roots and Characteristic vectors:** The Characteristic equation of transformation - Properties of the Eigen vectors - Cayley-Hamilton theorem (statement only)- Diagonalization of a Matrix.

**Text Book 2: Chapter 1.**

**Text Book 2: Chapter 4.**

[13 Hours]

|                      |
|----------------------|
| Seminar, Assignment. |
|----------------------|

### Text Books:

1. Manicavachagom pillay T. K, Natarajan T. and Ganapathy K. S, *Algebra Volume I*, First edition S. Viswanathan Pvt. Ltd, 2010.
2. Kandasamy P. and Thilagavathi K, *Mathematics for B. Sc. Branch - I, Volume II*, First Edition, 2004.

### Books for Reference:

1. Ray M. and Sharma H. S, *A text book of Higher Algebra*, S. Chand & Company, 1988
2. Thakur B. R, Sinha H. C, Agarwal B. L. and Johri V. B, *A text book of Algebra*, Ram Prasad & sons, 1970.

### Mapping

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|----------|-----|-----|-----|-----|-----|
| CO1      | H   | H   | M   | M   | L   |
| CO2      | H   | M   | H   | M   | H   |
| CO3      | M   | H   | M   | M   | L   |
| CO4      | H   | H   | M   | M   | M   |

**H- High; M- Medium; L- Low**

| Course Designed by                                                                  | Verified by HOD                                                                     | Checked by CDC                                                                       | Approved by COE                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |

**K. SRINIVASAN, M.C.A.**  
Co-ordinator  
Curriculum Development Cell (CDC)  
NGM College (Autonomous)  
Pollachi - 642 001.

**Dr. R.MUTHUKUMARAN**  
Controller of Examinations  
NGM College (Autonomous)  
POLLACHI - 642 001.

|                        |          |                          |                  |           |
|------------------------|----------|--------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b> | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS102 | <b>Title</b>             | <b>Batch :</b>   | 2020-2023 |
|                        |          | CALCULUS                 | <b>Semester</b>  | I         |
| <b>Hrs/Week</b>        | 6        |                          | <b>Credits :</b> | 5         |

### Course Objective

This paper enables the students to gain the ability to solve the problems related to multiple integrals, Beta and Gamma functions. It also provides the basic knowledge about Laplace transforms and use it to solve the differential equations.

### Course Outcomes (CO)

On completion of this course, the students will be able to

|    |     |                                                                                                                                                                          |
|----|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K1 | CO1 | acquire knowledge in solving the double integrals on both Cartesian and polar co-ordinates.                                                                              |
| K2 | CO2 | apply the concepts of Beta and Gamma functions on multiple integrals and demonstrate the different integrals of partial differential equations and Lagrange's equations. |
| K3 | CO3 | use the special methods of finding the particular integral of several linear differential equations with constant and variable co-efficients.                            |
| K4 | CO4 | understand the concept of Laplace transforms and inverse Laplace transforms and using it to solve ordinary differential equations with constant co-efficients.           |

### Unit -1

**Linear differential equations with constant coefficients:** Differential equation of higher order- The operators  $D$  and  $D^{-1}$  – Particular integral - Special methods of finding particular integral - Linear equations with variable coefficients – To find the particular integral – Special method of evaluating the P.I. when  $X$  is of the form  $x^m$ .

**Text Book 2 : Chapter 2: Sections: 1 - 4 & 8.**

[15 Hours]

### Unit -2

**Partial Differential Equations:** Derivation of partial differential equations by elimination of arbitrary constants and by arbitrary functions - Different integrals of partial differential equations – Solutions of partial differential equations in some simple cases - Standard types of first order equations (*Type IV - Self study*) - Lagrange's equation.

**Text Book 2 : Chapter 4: Sections: 1 - 6.**

[16 Hours]

### Unit -3

**Multiple Integrals:** Definition of double integral - Evaluation of the double integral - Double integral in polar co-ordinates - Triple integrals – Applications of multiple integrals (problems only).

**Text Book 1 : Chapter 5: Sections: 1 - 5.**

[15 Hours]

#### Unit -4

**Change of Variables** : Jacobians - Two important results regarding Jacobians - Change of variable in the case of two variables - Change of variable in the case of three variables - Transformation from Cartesian to polar co-ordinates - Transformation from Cartesian to spherical polar co-ordinates.

**Beta and Gamma Functions** : Definitions - Convergence of  $\Gamma(n)$  - Recurrence formula of Gamma functions - Properties of Beta functions - Relation between Beta and Gamma functions - Examples - Applications of Gamma functions to multiple integrals.

**Text Book 1 : Chapter 6**

**Chapter 7: Sections 2 - 6.**

[16 Hours]

#### Unit -5

**The Laplace Transforms**: Definitions - Transform of  $f(t)$ ,  $e^{at}$ ,  $\cos at$ ,  $\sin at$  and  $t^n$  when  $n$  is an integer - Using Laplace transforms to evaluate integrals - *Inverse Laplace transforms (Self study)*- Finding the Laplace transforms of functions to get the inverse transforms of functions-- Laplace transforms to solve ordinary differential equation with constant coefficients.

**Text Book 2 : Chapter 5: Sections 1,2,4 - 8.**

[16 Hours]

|                      |
|----------------------|
| Seminar, Assignment. |
|----------------------|

#### Text Books:

1. Narayanan S. and Manicavachagom Pillay T. K, *Calculus Volume - II*, S. Viswanathan Pvt. Ltd, 2010.
2. Narayanan S. and Manicavachagom Pillay T. K, *Calculus Volume - III*, S. Viswanathan Pvt. Ltd, 2010.

#### Books for References:

1. Dass H. K, *Advanced Engineering Mathematics (Sixteenth Edition)*, S. Chand and Company Ltd, New Delhi, 2006.
2. Kandasamy P. and Thilagavathi K, *Allied Mathematics (Paper - II)*, S. Chand and Company Ltd, New Delhi, 2004.
3. Kandasamy P. and Thilagavathi K, *Mathematics (Volume - III)*, S. Chand and Company Ltd, New Delhi, 2010.

### Mapping

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | M   | H   | M   | H   | L   |
| CO2     | M   | H   | H   | M   | H   |
| CO3     | H   | M   | H   | H   | H   |
| CO4     | H   | M   | M   | H   | M   |

**H- High; M- Medium; L- Low**

| Course Designed by                                                                | Verified by HOD                                                                   | Checked by CDC                                                                     | Approved by COE                                                                     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |

**K. SRINIVASAN, M.C.A.,**  
Co-ordinator  
Curriculum Development Cell (CDC)  
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**Dr. R.MUTHUKUMARAN**  
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|                        |          |                             |                  |           |
|------------------------|----------|-----------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b>    | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS1A1 | <b>Title</b>                | <b>Batch :</b>   | 2020-2023 |
|                        |          | MATHEMATICAL STATISTICS - I | <b>Semester</b>  | I         |
| <b>Hrs/Week</b>        | 6        |                             | <b>Credits :</b> | 5         |

### Course Objective

The aim of this course is to introduce the concept of discrete and continuous random variables, probability functions, expectations, moment generating functions and some discrete and continuous distributions and should have developed skills to apply them to various real life situations.

### Course Outcomes (CO)

On successful completion of the course, the students will be able to

|    |     |                                                                                  |
|----|-----|----------------------------------------------------------------------------------|
| K1 | CO1 | understand random variables and probability distributions.                       |
| K2 | CO2 | know the difference between discrete and continuous random variables.            |
| K3 | CO3 | compute expected value and variance of discrete and continuous random variables. |
| K4 | CO4 | acquire the knowledge by using Binomial distribution, Poisson distribution etc.  |

### Unit -1

#### Random Variables and Distribution Functions:

Two Dimensional Random Variables - Two Dimensional or Joint Probability Mass Function - Two Dimensional Distribution function - Marginal Distribution functions - Joint Density function - Marginal Density Function - The conditional Distribution Function and Conditional Probability Density function - Simple problems.

**Chapter 5: Sections: 5.5, 5.5.1 - 5.5.5.**

#### Mathematical Expectation:

Introduction - Mathematical Expectation or Expected value of Random variable - Expected value of function of a Random variable - Properties of Expectation.

**Chapter 6: Sections: 6.1-6.4.**

[16 Hours]

### Unit -2

#### Mathematical Expectation:

Properties of Variance - Covariance – Variance of a linear combination of Random variables - Moments of Bivariate Probability Distributions - Conditional Expectation and Conditional Variance - Simple problems.

**Chapter 6: Sections: 6.5, 6.6, 6.6.1, 6.8, 6.9.**

#### Moment Generating Functions:

Moment Generating Functions - Properties of Moment Generating Functions - Uniqueness Theorem of Moment Generating Functions - Cumulants - *Properties of Cumulants (Self study)* - Simple problems.

**Chapter 7: Sections: 7.1, 7.1.2, 7.1.3, 7.2, 7.2.1.**

[15 Hours]

### Unit -3

#### Moment Generating Functions:

*Characteristic Function (Self study)* - Properties of Characteristics Function - Chebychev's inequality - Simple problems.

**Chapter 7: Sections: 7.3, 7.3.1, 7.5.**

#### Special Discrete Probability Distributions:

Binomial distribution - Moments of Binomial Distribution - Recurrence Relation for the Moments of Binomial Distribution - Moment Generating function of Binomial Distribution - Additive property of Binomial Distribution- Simple problems.

Poisson distribution - Moments of Poisson distribution - Recurrence relation of Moments of the Poisson distribution - Moment Generating function of Poisson Distribution - Characteristics Function of the Poisson distribution – Cumulants of the Poisson distribution Additive or reproductive property of independent Poisson variates - Simple problems.

**Chapter 8: Sections: 8.4, 8.4.1, 8.4.2, 8.4.6, 8.4.7, 8.5, 8.5.2, 8.5.4, 8.5.5, 8.5.8** [16 Hours]

### Unit -4

#### Special Continuous Probability Distributions:

Normal distribution - Chief Characteristics of the Normal Distribution - M.G.F. of Normal distribution - C.G.F. of Normal distribution - Moments of Normal Distribution - A linear combination of independent normal variates - Simple problems.

Rectangular distribution - Moments of Rectangular distribution - MGF of Rectangular distribution - Characteristic function of Rectangular distribution - Mean Deviation about Mean -Simple problems.

**Chapter 9: Sections: 9.2, 9.2.2, 9.2.5, 9.2.6, 9.2.7, 9.2.8, 9.3-9.3.4.** [15 Hours]

### Unit -5

#### Special Continuous Probability Distributions:

Gamma Distribution - M.G.F. of Gamma distribution - C.G.F. of Gamma distribution Additive property of Gamma Distribution - Beta distributions of first kind - Constants of Beta distributions of first kind - Beta distributions of second kind - Constants of Beta distributions of second kind - Exponential distribution - M.G.F. of Exponential distribution - Simple problems.

**Chapter 9: Sections: 9.5-9.5.3, 9.6, 9.6.1, 9.7, 9.7.1, 9.8, 9.8.1.** [16 Hours]

|                      |
|----------------------|
| Seminar, Assignment. |
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#### Text Book:

Gupta S. C. and Kapoor V. K, *Fundamentals of Mathematical Statistics, Eleventh Edition* S. Chand & Sons, 2009.

**Books for Reference:**

1. Hogg R.V. and Craigh A. G, *Introduction to Mathematical Statistics*, Pearson Education publications, 2004.
2. Veerarajan .T, *Fundamentals of Mathematical Statistics*, Yes Dee Publishing Pvt.Ltd, 2017.
3. Vital P. R, *Mathematical Statistics*, Margham publications, 2004.

**Mapping**

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | M   | H   | M   | M   | L   |
| CO2     | H   | M   | M   | H   | M   |
| CO3     | H   | H   | M   | M   | M   |
| CO4     | M   | M   | M   | H   | L   |

**H- High; M- Medium; L- Low**

| Course Designed by                                                                  | Verified by HOD                                                                     | Checked by CDC                                                                       | Approved by COE                                                                       |
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|                        |          |                                                  |                  |           |
|------------------------|----------|--------------------------------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b>                         | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS203 | <b>Title</b>                                     | <b>Batch :</b>   | 2020-2023 |
|                        |          | TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES | <b>Semester</b>  | II        |
| <b>Hrs/Week</b>        | 5        |                                                  | <b>Credits :</b> | 4         |

### Course Objective

This paper enables the students to provide basic knowledge of trigonometry, vector calculus and Fourier series.

### Course Outcomes (CO)

On successful completion of the course, the students will be able to

|    |     |                                                                                                                                   |
|----|-----|-----------------------------------------------------------------------------------------------------------------------------------|
| K1 | CO1 | understand the expansions of trigonometric functions, the nature of hyperbolic functions, Fourier Series, Vector point functions. |
| K2 | CO2 | find the Fourier co-efficient for Periodic functions and its applications.                                                        |
| K3 | CO3 | apply the concepts of Gradient, Divergence and Curl in solving vector differentiation problems.                                   |
| K4 | CO4 | solve the multiple integrals by applying Gauss divergence theorem, Stoke's theorem and Green's theorem.                           |

### Unit -1

#### Expansions and Inverse circular functions:

Expansions of  $\cos^n \theta$  and  $\sin^n \theta$  - Expansions of  $\cos n\theta$  and  $\sin n\theta$  – Power series for  $\sin x$  and  $\cos x$  – Trigonometric equations – Relations among inverse functions – Related problems.

**Text Book 1: Chapter 4: Sections: 4.1 – 4.5.** [14 Hours]

### Unit -2

#### Circular and Hyperbolic Functions:

Exponential function – Circular functions - hyperbolic functions - Relations between circular and hyperbolic functions – Period of function - Inverse hyperbolic functions.

**Text Book 1: Chapter 6: Sections: 6.1 – 6.6.** [13 Hours]

### Unit -3

#### Fourier Series:

Definition - Finding Fourier co-efficient for given periodic functions with period  $2\pi$  and  $2l$ - Even and odd functions - Half range series.

**Text Book 2: Chapter 6: Sections: 1 – 6.1.** [13 Hours]

### Unit -4

**Vector differentiation:** Gradient, Curl and Divergence- Scalar and vector point functions - Level surface - Gradient of a scalar point function - Directional derivative of a scalar point function - Theorems (statement only) - *Equations of tangent plane and normal line to a level surface (Self study)* - Divergence and curl of a vector point function - Solenoidal vector - Irrotational vector - Vector identities.

**Text Book 3: Chapter 1.** [12 Hours]

## Unit -5

**Vector integration:** Line integral - Theorems on line integrals - Surface and Volume integrals - Gauss Divergence theorem - Stoke's theorem - Green's theorem in plane. (Statement only and relevant problems).

**Text Book 3: Chapter 2.**

[13 Hours]

Seminar, Assignment.

### Text Books:

1. Duraipandian P, Laxmi Duraipandian and Jayamala paramasivan, Trigonometry, Emerald Publishers, 1999.
2. Narayanan S., Manicavachagom Pillay T. K, Viswanathan S., *Calculus Volume III*, (Printers & Publishers), Pvt. Ltd, 2010.
3. Vittal P. R., Malini V., *Vector Analysis*, Margham publication, 1997.

### Books for References:

1. Gupta R, *Vector Calculus*, Firewall media.
2. Narayanan S. and Manicavachagom pillay T. K, *Trigonometry*, Viswanathan S, Pvt. Ltd, 2012.

### Mapping

| PO \ CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | H   | H   | M   | M   | M   |
| CO2     | M   | H   | H   | M   | M   |
| CO3     | H   | M   | M   | M   | L   |
| CO4     | M   | M   | M   | H   | L   |

H- High; M- Medium; L- Low

| Course Designed by                                                                  | Verified by HOD                                                                     | Checked by CDC                                                                       | Approved by COE                                                                       |
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|                        |          |                          |                  |           |
|------------------------|----------|--------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b> | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS204 | <b>Title</b>             | <b>Batch :</b>   | 2020-2023 |
|                        |          | ANALYTICAL GEOMETRY      | <b>Semester</b>  | II        |
| <b>Hrs/Week</b>        | 5        |                          | <b>Credits :</b> | 4         |

### Course Objective

This paper enables the student to gain fundamental ideas about co-ordinate geometry and gives clear knowledge about regular geometrical aspects and their properties in two dimensional and three dimensional analytical geometry.

### Course Outcomes (CO)

On completion of this course, the students will be able to:

|    |     |                                                                                                          |
|----|-----|----------------------------------------------------------------------------------------------------------|
| K1 | CO1 | recollect the properties of circle, sphere and can able to gain a deep knowledge in it.                  |
| K2 | CO2 | get the clear idea about the relation between polar and cartesian co-ordinates.                          |
| K3 | CO3 | compute the equation of a circle on a sphere.                                                            |
| K4 | CO4 | analyze the concepts of right circular cone, enveloping cone, General quadric cone and their properties. |

### Unit -1

Circle - *Common tangents to two circles (self study).*

**Text book 1: Chapter 4: Sections: 4.10 – 4.14.**

Parabola

**Text book 1: Chapter 6: Sections: 6.5-6.7.**

Ellipse

**Text book 1: Chapter 7: Sections: 7.6-7.8.**

Hyperbola - *Some properties of the asymptotes (self study).*

**Text book 1: Chapter 8: Sections: 8.4-8.6.**

[13 Hours]

### Unit -2

Polar Equations

**Text book 1: Chapter 9: Sections: 9.1 – 9.15.**

[13 Hours]

### Unit -3

Sphere

**Text book 2: Chapter 4: Sections: 4.1- 4.8.**

[13 Hours]

### Unit -4

Cone, Cylinder and Central quadrics

**Text book 2: Chapter 5: Sections: 5.1 – 5.7.**

[14 Hours]

**Unit -5**

Cone, Cylinder and Central quadrics

**Text book 2: Chapter 5: Sections: 5.8 – 5.13****[12 Hours]**

Seminar, Assignment.

**Text Books:**

1. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I two dimensions*, S. Viswanathan printers & publishers Pvt. Ltd, 2018.
2. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I three dimensions*, S. Viswanathan printers & publishers, Pvt. Ltd, 2019.

**Books for Reference :**

1. Duraipandian P, Laxmi Duraipandian, Muhilan D, *Analytical Geometry 2 dimensional*, Emerald publishers, 2000.
2. Duraipandian P, Laxmi Duraipandian, Muhilan D, *Analytical Geometry 3 dimensional*, Emerald publishers, 2000.

**3. Mapping**

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | M   | H   | M   | M   | L   |
| CO2     | H   | M   | M   | M   | M   |
| CO3     | H   | M   | H   | M   | M   |
| CO4     | M   | M   | H   | H   | M   |

H- High; M- Medium; L- Low

| Course Designed by                                                                  | Verified by HOD                                                                     | Checked by CDC                                                                       | Approved by COE                                                                       |
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|------------------------|----------|------------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b>     | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS2A2 | <b>Title</b>                 | <b>Batch :</b>   | 2020-2023 |
|                        |          | MATHEMATICAL STATISTICS – II | <b>Semester</b>  | II        |
| <b>Hrs/Week</b>        | 6        |                              | <b>Credits :</b> | 5         |

### Course Objective

The objective of this paper is to introduce the concepts about correlation, regression, sample theory, sampling distributions and theory of estimation.

### Course Outcomes (CO)

On completion of this course, the students will be able to

|    |     |                                                                                                        |
|----|-----|--------------------------------------------------------------------------------------------------------|
| K1 | CO1 | understand the meaning of correlation, regression and its properties.                                  |
| K2 | CO2 | analyze the concepts of sampling techniques and procedure for testing of hypothesis for large samples. |
| K3 | CO3 | demonstrate the use of chi-square distribution                                                         |
| K4 | CO4 | apply the concepts of t, F, z-distributions and its applications.                                      |

### Unit -1

**Correlation:** Introduction – Meaning of correlation – Scatter diagram - Karl Pearson's co-efficient of Correlation - Limits for Correlation Coefficient - Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution - Rank Correlation - Spearman's Rank Correlation Coefficient - problems only (no derivations).

**Chapter 10: Sections: 10.1, 10.2, 10.3, 10.4, 10.4.1, 10.5, 10.7, 10.7.1.**

**Linear Regression:** Introduction – Linear Regression - Regression Coefficients - Properties of Regression Coefficients- *Angle between two Lines of Regression (Self study)* - Simple Problems.

**Chapter 11: Sections: 11.1, 11.2, 11.2.1, 11.2.2, 11.2.3.** [16 Hours]

### Unit -2

**Large Sample Theory:** Introduction – Types of sampling – Purposive sampling -Random Sampling – simple sampling – Stratified sampling - Parameter and Statistic - Sampling Distribution of a Statistic - Standard Error - Tests of Significance - Null and alternative Hypothesis - Errors in sampling - Critical Region and Level of Significance - One-tailed and Two-tailed tests - Critical Values or Significant Values - Procedure for Testing of Hypothesis - Tests of Significance for Large Samples - Sampling of Attributes - Test of significance for Single Proportion - Test of significance for Difference of Proportions - Simple Problems.

**Chapter 14 : Sections: 14.1, 14.2, 14.2.1, 14.2.2, 14.2.3, 14.2.4, 14.3, 14.3.1, 14.3.2, 14.4, 14.4.1-14.4.5, 14.5, 14.6, 14.7, 14.7.1, 14.7.2.** [16 Hours]

### Unit -3

**Large Sample Theory:** Sampling of Variables - Test of significance for Single Mean - *Test of significance for Difference of Means (Self study)*- Simple Problems.

**Chapter: 14 : Sections: 14.8, 14.8.3, 14.8.4.**

**Chi – square ( $\chi^2$ ) Distribution:** Applications of Chi- square Distribution - Inferences about a Population Variance - Goodness of Fit Test - Test of Independence of Attributes--Contingency Tables - Simple Problems.

**Chapter 15: Sections: 15.6, 15.6.1, 15.6.2, 15.6.3.** [15 Hours]

#### Unit -4

**t, F, z Distributions:** Applications of t-Distribution - t-test for Single Mean - t-test for Difference of Means - t-test for Testing the Significance of an Observed Sample Correlation Coefficient - Applications of F-Distribution - F-test for Equality of Two Population Variances - Simple Problems.

**Chapter 16: Sections: 16.3, 16.3.1, 16.3.2, 16.3.4, 16.6, 16.6.1.**

[16 Hours]

#### Unit -5

**Theory of Estimation:** Introduction - Characteristic of estimators – Unbiasedness – Consistency – Efficient estimators – Sufficiency – Cramer-Rao inequality – Simple problems – Methods of estimation – Method of maximum likelihood estimation – Properties of maximum Likelihood Estimators – Method of moments - Simple Problems.

**Chapter 17: Sections: 17.1, 17.2, 17.2.1, 17.2.2, 17.2.3, 17.2.4, 17.3, 17.6, 17.6.1, 17.6.3.**

[15 Hours]

Seminar, Assignment.

#### Text Book:

Gupta S. C and Kapoor V. K, *Fundamentals of Mathematical Statistics*,  
S. Chand & Sons, 2009.

#### Books for References:

1. Hogg R. V and Craigh A. G, *Introduction to Mathematical Statistics*, Pearson Education publications, 2004.
2. Veerarajan .T, *Fundamentals of Mathematical Statistics*, Yes Dee Publishing Pvt.Ltd, 2017.
3. Vital P. R, *Mathematical Statistics*, Margham publications, 2004.

#### Mapping

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | H   | H   | M   | M   | M   |
| CO2     | H   | H   | H   | M   | L   |
| CO3     | H   | H   | H   | M   | H   |
| CO4     | H   | H   | M   | M   | M   |

H- High; M- Medium; L- Low

| Course Designed by                                                                  | Verified by HOD                                                                     | Checked by CDC                                                                       | Approved by COE                                                                       |
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|------------------------|----------|--------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b> | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS306 | <b>Title</b>             | <b>Batch :</b>   | 2020-2023 |
|                        |          | NUMERICAL TECHNIQUES     | <b>Semester</b>  | III       |
| <b>Hrs/Week</b>        | 4        |                          | <b>Credits :</b> | 3         |

### Course Objective

This course helps the students to have an in-depth knowledge of various advanced methods in numerical analysis. The students to use numerical techniques to get numerical solutions of equations like transcendental and non linear differential equations when ordinary analytical methods fail.

### Course Outcomes (CO)

On successful completion of the course the students will be able to

|    |     |                                                                                                                                                                 |
|----|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K1 | CO1 | derive numerical methods for approximating the solution of the problems of algebraic and transcendental equations, ordinary and partial differential equations. |
| K2 | CO2 | implement a variety of numerical algorithms using appropriate technology                                                                                        |
| K3 | CO3 | get practical knowledge of polynomial interpolation. Also numerical algorithms are used in C++ for solving scientific problems.                                 |
| K4 | CO4 | solve the ordinary differential equations by using the methods like Euler's, Runge Kutta, Modified Euler and Improved Euler.                                    |

### Unit -1

**The solution of Numerical Algebraic and Transcendental Equations:** Introduction - The Bisection method - The iteration method - The method of false position (Regula Falsi Method) - Newton Raphson method.

#### Chapter 3: Sections: 1 - 5.

#### Simultaneous Linear Algebraic Equations:

Introduction – Gauss Elimination Method – Gauss Jordan Method – Computation of the inverse of a Matrix using Gauss's Elimination Method.

#### Chapter 4: Sections: 1 – 3.

[ 11 Hours]

### Unit -2

#### Simultaneous Linear Algebraic Equations:

Iterative Methods - Gauss-Jacobi Method – Gauss-Seidal Method – *Comparison of Gauss elimination and Gauss-Seidal Iteration methods (Self study).*

#### Chapter 4: Sections: 6, 7.

**Interpolation:** Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values.

#### Chapter 6: Sections: 1 - 5.

[10 Hours]

### Unit -3

**Numerical Differentiation:** Introduction - Newton's forward difference formula to compute the derivatives - Newton's backward difference formula to compute the derivatives - Derivatives using Stirling's formula.

#### Chapter 9: Sections: 1 - 4.

**Numerical Integration:** The Trapezoidal rule - Romberg's method - Simpson's one third rule - Practical applications of Simpson's rule.

**Chapter 9: Sections: 8 -10 and 12.**

[10 Hours]

#### Unit -4

#### **Numerical Solution of Ordinary Differential Equations:**

Solution by Taylor Series - Taylor Series method for higher order differential equations - Euler's method - Improved Euler's method - Modified Euler method - Runge Kutta method - Second order Runge Kutta Method - *Higher order Runge Kutta methods (Self study).*

**Chapter 11: Sections: 6, 8, 10 - 15.**

[10 Hours]

#### Unit -5

#### **Numerical Solution of Partial Differential Equations:**

Elliptic equations – Solution of Laplace's equation by Iteration – Poisson's equation.

**Chapter 12: Sections: 5, 6, 7.**

[11 Hours]

Seminar, Assignment.

#### **Text Book:**

Venkataraman M. K, *Numerical Methods in Science and Engineering*, The National Publishing Company, Madras, 2009.

#### **Books for Reference :**

Kandasamy P, Thilagavathy K and Gunavathi K, *Numerical Methods*, S. Chand company Ltd, 2012.

#### **Mapping**

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | H   | M   | H   | H   | L   |
| CO2     | H   | H   | M   | H   | M   |
| CO3     | H   | M   | H   | M   | M   |
| CO4     | M   | M   | M   | H   | M   |

H- High; M- Medium; L- Low

| Course Designed by                                                                  | Verified by HOD                                                                     | Checked by CDC                                                                       | Approved by COE                                                                       |
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|                        |          |                                |                  |           |
|------------------------|----------|--------------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b>       | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS3N1 | <b>Title</b>                   | <b>Batch :</b>   | 2020-2023 |
|                        |          | NME: QUANTITATIVE APTITUDE - I | <b>Semester</b>  | III       |
| <b>Hrs/Week</b>        | 1        |                                | <b>Credits :</b> | 2         |

### Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

### Course Outcomes (CO)

On successful completion of the course, the students will be able to

|    |     |                                                            |
|----|-----|------------------------------------------------------------|
| K1 | CO1 | remember the meaning of HCF and LCM of numbers.            |
| K2 | CO2 | understand the concepts of odd man out & series.           |
| K3 | CO3 | analyze the concepts of ratio & proportion.                |
| K4 | CO4 | apply the concepts of profit & loss in real life problems. |

### Unit -1

**Percentage:** Introduction - Important facts and family - Concept of percentage - Simple problems.  
**Chapter 10.** [3 Hours]

**Simplification:** Introduction - BODMAS rule - Simple problems.  
**Chapter 4.**

### Unit -2

**Ratio and Proportion:** Ratio - Proportion - Simple problems.  
**Chapter 12:** [3 Hours]

### Unit -3

**Profit and loss:** Introduction - Cost price - Selling price - Profit and loss - Simple Problems.  
**Chapter 11 .** [2 Hours]

### Unit -4

**Permutations and Combinations:** Factorial Notation – Permutations – Combinations.  
**Chapter 30** [2 Hours]

### Unit – 5

**Probability:** Sample Space – Results on probability.  
**Chapter 34** [2 Hours]

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| Seminar, Assignment. |
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**Text Book:**

Aggarwal R. S, *Quantitative Aptitude*, S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.

**Mapping**

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | H   | M   | H   | M   | H   |
| CO2     | M   | H   | H   | M   | M   |
| CO3     | H   | M   | H   | M   | M   |
| CO4     | H   | M   | H   | H   | M   |

H- High; M- Medium; L- Low

| Course Designed by                                                                | Verified by HOD                                                                   | Checked by CDC                                                                      | Approved by COE                                                                      |
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|------------------------|----------|--------------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b>       | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS408 | <b>Title</b>                   | <b>Batch :</b>   | 2020-2023 |
|                        |          | <b>OPERATIONS RESEARCH - I</b> | <b>Semester</b>  | IV        |
| <b>Hrs/Week</b>        | 5        |                                | <b>Credits :</b> | 4         |

### Course Objective

The prime objective of this paper is to introduce certain OR techniques such as LPP, Transportation problems, Assignment problems, Sequencing and Replacing models to help the students to develop logical reasoning for applying mathematical tools to managerial and real life oriented problems.

### Course Outcomes (CO)

On successful completion of the course, the students will able to

|    |     |                                                                             |
|----|-----|-----------------------------------------------------------------------------|
| K1 | CO1 | solve linear programming problem using Simplex Method.                      |
| K2 | CO2 | apply the notions of linear programming in solving transportation problems. |
| K3 | CO3 | acquire knowledge in formulating Assignment problem                         |
| K4 | CO4 | become familiar with some of the Queuing models.                            |

### Unit -1

**Linear Programming Problem: Mathematical formulation:** Introduction - Linear Programming Problem - Mathematical Formulation of the Problem – illustration on Mathematical formulation of LPP's.

### Chapter 2: Sections: 2.1 - 2.4

**Linear Programming Problem: Graphical Solution and Extension:** Introduction - Graphical Solution Method – Some exceptional cases - General Linear Programming Problem - Canonical and Standard Forms of L.P.P.

### Chapter 3: Sections: 3.1 - 3.5

[14 Hours]

### Unit -2

**Linear Programming Problem: Simplex Method:** Introduction - The Computational Procedure – Use of Artificial Variables - Degeneracy in Linear Programming - Applications of Simplex Method.

### Chapter 4: Sections: 4.1, 4.3 - 4.5.

[13 Hours]

### Unit -3

**Duality in Linear Programming:** Introduction – General Primal-Dual pair – Formulating a Dual problem - Primal-Dual pair in Matrix form- Duality Theorems – Duality and Simplex Method.

### Chapter 5: Sections: 5.1 – 5.4, 5.5, 5.7(Excluding Two-phase method in 4.4.) [13 Hours]

### Unit -4

### Transportation Problem:

LP formulation of the Transportation Problem - Existence of Solution in TP - The Transportation Table - Loops in Transportation Tables - Finding an initial basic feasible solution - North West corner rule - Least cost Method - *Vogel's approximation Method (Self study)* -Test for Optimality - Determining the Net evaluations (The uv method) - Transportation algorithm (MODI Method) - Some exceptional cases - Unbalanced Transportation Problem.

### Chapter 10: Sections: 10.2, 10.3, 10.5, 10.6, 10.9, 10.10, 10.13, 10. 15.

[13 Hours]

## Unit -5

**Assignment & Replacement Problem:** Introduction - Mathematical Formulation of the Assignment Problem - Solution of Assignment Problem – Hungarian Assignment Method - Special cases in Assignment Problems – The Travelling Salesman problem – Introduction - Replacement of equipment / Asset that deteriorates gradually - Value of money does not change with time - Value of money changes with time - Selection of best equipment amongst two - Simple problems.

**Chapter 11: Sections: 11.1- 11.3, 11.4, 11.7.**

**Chapter 18: Sections: 18.1, 18.2.**

[12 Hours]

Seminar, Assignment.

### Text Book:

Kanti Swarup, Gupta P. K and Man Mohan, *Operations Research*, Sultan Chand & Sons, New Delhi, 2014.

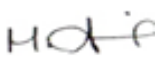
### Books for Reference:

1. Phillips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.
2. Taha H. A, *Operation Research - An introduction*, Prentice Hall of India Pvt Ltd, New Delhi, 2006.

### Mapping

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|----------|-----|-----|-----|-----|-----|
| CO1      | H   | M   | H   | H   | M   |
| CO2      | H   | H   | M   | M   | M   |
| CO3      | H   | M   | H   | M   | M   |
| CO4      | H   | M   | M   | H   | L   |

H- High; M- Medium; L- Low

| Course Designed by                                                                  | Verified by HOD                                                                     | Checked by CDC                                                                       | Approved by COE                                                                       |
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|                        |          |                                 |                  |           |
|------------------------|----------|---------------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc.    | <b>Programme Title :</b>        | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS4N3 | <b>Title</b>                    | <b>Batch :</b>   | 2020-2023 |
|                        |          | NME: QUANTITATIVE APTITUDE - II | <b>Semester</b>  | IV        |
| <b>Hrs/Week</b>        | 1        |                                 | <b>Credits :</b> | 2         |

### Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

### Course Outcomes (CO)

On successful completion of the course, the students will be able to

|    |     |                                                           |
|----|-----|-----------------------------------------------------------|
| K1 | CO1 | remember the meaning of BODMAS rule.                      |
| K2 | CO2 | understand the concept of percentage on simple problems.  |
| K3 | CO3 | analyze the problem on trains with solved examples.       |
| K4 | CO4 | apply the concept of time and work on real life problems. |

#### Unit -1

**Problems on ages:** Problems on ages - Simple problems.

**Chapter 8.**

[3 Hours]

#### Unit -2

**Time and work:** Time and work - Simple problems.

**Chapter 15.**

[2 Hours]

#### Unit -3

**Time and Distance :** Time and Distance - Simple problems

**Chapter 17.**

[2 Hours]

#### Unit -4

**Problems on trains:** Problems on trains with solved examples.

**Chapter 18.**

[2 Hours]

#### Unit -5

**Boats and Streams:** Boats and Streams - Simple problems

**Chapter 19.**

[2 Hours]

|                      |
|----------------------|
| Seminar, Assignment. |
|----------------------|

### Text Book:

Aggarwal R. S, *Quantitative Aptitude*, S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.

### Mapping

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | M   | H   | M   | M   | H   |
| CO2     | H   | H   | H   | M   | H   |
| CO3     | M   | M   | H   | H   | M   |
| CO4     | H   | H   | M   | M   | H   |

H- High; M- Medium; L- Low

| Course Designed by                                                                | Verified by HOD                                                                   | Checked by CDC                                                                     | Approved by COE                                                                     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
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|                        |          |                          |                  |           |
|------------------------|----------|--------------------------|------------------|-----------|
| <b>Programme Code:</b> | B.Sc     | <b>Programme Title :</b> | Mathematics      |           |
| <b>Course Code:</b>    | 20UMS511 | <b>Title</b>             | <b>Batch :</b>   | 2020-2023 |
|                        |          | OPERATIONS RESEARCH -II  | <b>Semester</b>  | V         |
| <b>Hrs/Week</b>        | 5        |                          | <b>Credits :</b> | 4         |

### Course Objective

The prime objective of this paper is to introduce certain OR techniques such as game theory, sequencing and networking models to help the students to develop logical reasoning for applying mathematical tools to managerial and other life oriented problems

### Course Outcomes (CO)

On successful completion of the course the students will be able to

|    |     |                                                          |
|----|-----|----------------------------------------------------------|
| K1 | CO1 | understand the theory of games for solving simple games. |
| K2 | CO2 | explore various techniques to solve real life problems.  |
| K3 | CO3 | apply the fundamental concept of inventory control.      |
| K4 | CO4 | know distinction between PERT & CPM                      |

### Unit -1

**Games and strategies:** Two person zero sum games - Some basic terms - The Maximin - Minimax principle - Games without Saddle points - Mixed strategies - Graphical Solution of  $2 \times n$  and  $m \times 2$  games – Dominance Property.

**Chapter 17: Sections: 17.1 - 17.7.**

[13 Hours]

### Unit -2

**Sequencing problems:** Problem of Sequencing - Basic terms used in Sequencing - Processing  $n$  jobs through 2 machines - *Processing  $n$  jobs through  $k$ -machines (Self study)* processing 2 jobs through  $k$ -machines.

**Chapter 12: Sections: 12.1 - 12.6.**

[13 Hours]

### Unit -3

**Queuing Theory:** Introduction - Queuing System - Elements of a Queuing System - Operating characteristics of a Queuing system - Classification of Queueing Models – Definition of Transient and Steady States - Poisson Queuing System

Model I : (M/M/ 1): ( $\infty$ /FIFO)

Model III : (M/M/ 1): (N/FIFO)

Model V : (M/M/ C): ( $\infty$ /FIFO)

Model VI : (M/M/ C): (N/FIFO)(Self study) - Simple Problems.

**Chapter 21: Sections: 21.1 - 21.4, 21.7, 21.8, 21.9.**

[14 Hours]

### Unit -4

**Inventory control:** Introduction - Types of inventories - Reasons for carrying inventories- The inventory decisions - Costs associated with inventories - Factors affecting inventory control - The concept of EOQ - Deterministic inventory problems with no shortages.

Case (i) The fundamental Problem of EOQ

Case (ii) Problem of EOQ with finite replenishment (Production).

Deterministic inventory Problems with shortages

Case (i) Problem of EOQ with instantaneous Production and variable order cycle

Case (ii) Problem of EOQ with instantaneous Production and Fixed order cycle.

Case (iii) Problem of EOQ with finite replenishment (Production).

Problem of EOQ with price breaks

Case (i) Problem of EOQ with one price break

Case (ii) Problem of EOQ with more than one price break.

**Chapter 19: Sections: 19.1 - 19.4, 19.6, 19.7, 19.9-19.12.**

[13 Hours]

### Unit -5

**Network scheduling by PERT/CPM:** Network: Basic compounds - Logical Sequencing - Rules of Network constructions – Concurrent Activities - *Critical Path Method (CPM) (Self study)* - Probability considerations in PERT - Distinction between PERT & CPM - Simple Problems.

**Chapter 25: Sections: 25.1 - 25.8.**

[12 Hours]

Seminar, Assignment.

### Text Book:

Kanti Swarup, Gupta P.K. & Man Mohan, Operations Research (2014), Sultan Chand & Sons, New Delhi.

### Books for Reference:

1. Philips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.
2. Taha H. A, *Operation Research - An introduction*, Prentice Hall of India Pvt. Ltd, New Delhi, 2006.

### Mapping

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 |
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| CO2     | H   | H   | M   | M   | M   |
| CO3     | M   | H   | H   | M   | L   |
| CO4     | M   | M   | M   | M   | M   |

H- High; M- Medium; L- Low

| Course Designed by                                                                  | Verified by HOD                                                                     | Checked by CDC                                                                       | Approved by COE                                                                       |
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