

B.Sc., MATHEMATICS

Syllabus

Program Code: UMT

2018- Onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with “A” Grade by NAAC

PASUMALAI, MADURAI – 625 004

Qualification for Admission

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu CBSE Board with Mathematics as one of the subjects in Higher Secondary Education.

Duration of the Course

The students shall undergo the prescribed B.Sc(Mathematics) course of study for a period of three academic years (six semesters).

Subject of Study

- Part I: Tamil
- Part II: English
- Part III:
 - 1. Core Subjects
 - 2. Allied Subjects
 - 3. Electives
- Part IV :
 - 1. Non Major Electives
 - 2. Skill Based Subjects
 - 3. Environmental Studies
 - 4. Value Education
- Part V :
 - Extension activities

The scheme of Examination

The components for continuous internal assessment are:

Two tests and their average	--15 marks
Seminar /Group discussion	--5 marks
Assignment	--5 marks
Total	--25 marks

Pattern of the questions paper for the continuous Internal Assessment

(For Part I, Part II, Part III , NME & Skilled Paper in Part IV)

The components for continuous internal assessment are:

Part –A

Six multiple choice questions (answer all) 6 x 01= 06 Marks

Part –B

Two questions (‘either or ‘type) 2 x 07=14 Marks

Part –C

One question out of two 1 x 10 =10 Marks

Total 30 Marks

Pattern of the question paper for the Summative Examinations:

Note: Duration- 3 hours

Part –A

Ten multiple choice questions 10 x 01 = 10 Marks

(No Unit shall be omitted; not more than two questions from each unit.)

Part –B

Five Paragraph questions (‘either or ‘type) 5 x 07 = 35 Marks

(One question from each Unit)

Part –C

Three Essay questions out of five 3 x 10 =30 Marks

(One question from each Unit)

Total 75 Marks

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average --15 marks

Project Report --10 marks*

Total --25 marks

** The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

Part –A

(Answer is not less than 150 words)

Four questions ('either or 'type)

4 x 05=20 Marks

Part –B

(Answer is not less than 400 words)

One question ('either or 'type)

1 x 10=10 Marks

Total

30 Marks

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

Part –A

(Answer is not less than 150 words)

Five questions (either or type)

5 x 06 =30 Marks

(One question from each Unit)

Part –B

(Answer is not less than 400 words)

Three questions out of Five
each unit (One question from each Unit)

3 x 15 = 45 Marks

Total

75 Marks

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).

No separate pass minimum for the Internal Examinations.

27 marks out of 75 is the pass minimum for the Summative Examinations.

PROGRAM EDUCATIONAL OUTCOMES (PEO)

PEO1: Acquire good knowledge in analytical, algebraic structures, applied mathematics and statistics.

PEO2: Work independently and collaboratively in mathematical projects.

PEO3: Empower to face the competitive exams, employability in MNC, Govt. Sectors, etc.

PEO4: Engage in lifelong learning through continuing education, environmental studies.

PROGRAM OUTCOMES

PO1: Problem solving and analytic, reasoning

PO2: Modern tool usage and knowledge

PO3: Leadership readiness and Reflective thinking

PO4: Communication skills and Digital literacy

PO5: Moral and Ethical Reasoning

PO6: Cooperation and team work

PO7: Lifelong learning and research related skills

PROGRAMME SPECIFIC OUTCOMES

PSO1: To understand the basic rules of logic, including the role of axioms or assumptions

PSO2: To recognize connections between different branches of mathematics and appreciate the connections between theory and applications.

PSO3: To enable the students to gain knowledge in basic Mathematics.

PSO4: To provide sufficient knowledge on computer skills through MS office, C, C++ and Java Programming and many innovative and modern subjects in Mathematics.

B.Sc (Mathematics)
(Those who joined in 2018-2019 and after)
Table: 1: Course pattern

Study Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total Hours	Total Credit	No.of course	Total marks
Part – I Tamil	6(3)	6(3)	6(3)	6(3)			24	12	4	400
Part –II English	6(3)	6(3)	6(3)	6(3)			24	12	4	400
Part –III										
Core subjects	6(4)	6(5)	5(5) 5(5)	5(5) 5(5)	5(5) 5(5) 6(5) 6(5)	5(5) 5(5) 6(5) 6(5)	76	69	14	1400
Allied Subject-I	4(4)	4(3)	4(4)	4(3)			16	14	4	400
Allied Subject-I (P)	2(0)	2(1)	2(0)	2(1)			8	2	2	200
Allied Subject-II					6(5)	6(5)	12	10	2	200
Allied Subject – II (P)									1	100
Part-IV										
Allied Mathematics	6(4)	6(4)	4(4)	4(4)			20	16	4	400
Skill Based Subjects	2(2) 2(2)	2(2) 2(2)			2(2)	2(2)	12	12	6	600
Environment studies / value education	2(2)	2(2)					4	4	2	200
Non Major Elective			2(2)	2(2)			4	4	2	200
Part V										
Extension Activities				0(1)			0	1	1	100
Total	30 (20)	30 (21)	30 (22)	30 (23)	30 (27)	30 (27)	180	140	42	4200

SEMESTER – I

Subject code	Subjects	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int.	Ext	Total
18UTAG11	Part –I Tamil Subject Tamil –I: தற்கால கவிதையும் உரைநடையும்	1	6	3	25	75	100
18UENG11	Part –II English Subject Exploring Language Through Literature-I	1	6	3	25	75	100
18UMTC11	Part –III Core Subject Differential Calculus	1	6	4	25	75	100
18UPHA11	Part –III Allied Subject Allied Physics –I Mechanics, Properties of Matter and Relativity	1	4	4	25	75	100
18UPHAP1	Allied Physics Practical - I	-	2	-	-	-	-
18UMTS11	Part –IV Skill Subject Numerical Aptitude	1	2	2	25	75	100
18UMTS12	Trigonometry	1	2	2	25	75	100
18UEVG11	Part –IV Mandatory Subject Environmental Studies	1	2	2	25	75	100
	Total	7	30	20	175	525	700

SEMESTER – II

Subject code	Subjects	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int	Ext	Total
18UTAG21	Part –I Tamil Subject Tamil –II: பக்தி இலக்கியமும் நாடகமும்	1	6	3	25	75	100
18UENG21	Part –II English Subject Exploring Language Through Literature-II	1	6	3	25	75	100
18UMTC21	Part –III Core Subject Theory of Equations and its applications	1	6	5	25	75	100
18UPHA21	Part –III Allied Subject Allied Physics –II Thermal Physics and Sound	1	4	3	25	75	100
18UPHAP1	Allied Physics Practical - I	1	2	1	40	60	100
18UMTS21	Part –IV Skill Subject MS Office	1	2	2	25	75	100
18UMTSP1	MS Office Lab	1	2	2	40	60	100
18UVLG21	Part –IV Mandatory Subject Value Education	1	2	2	25	75	100
	Total	8	30	21	230	570	800

SEMESTER –III							
Subject code	Subjects	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int	Ext	Total
18UTAG31	Part –I Tamil காப்பிய இலக்கியமும் சிறுகதையும்	1	6	3	25	75	100
18UENG31	Part –II English Exploring Language Through Literature-III	1	6	3	25	75	100
18UMTC31	Part –III Core Subject Integral Calculus	1	5	5	25	75	100
18UMTC32	Sequences and Series	1	5	5	25	75	100
18UPHA31	Part –III Allied Subject Allied Physics –III Electricity and Electronics	1	4	4	25	75	100
18UPHAP2	Allied Physics Practical - II	-	2				
18UMTN31	Part –IV NME Mathematics for Competitive Examination - I	1	2	2	25	75	100
Total		6	30	22	150	450	600

SEMESTER IV							
Subject Code	Title of the Paper	No.of Courses	Hours /Week	Credits	Maximum Marks		
					Int	Ext	Total
18UTAG41	Part – I Tamil பழந்தமிழ் இலக்கியமும் புதினமும்	1	6	3	25	75	100
18UENG41	Part –II English Exploring Language Through Literature-IV	1	6	3	25	75	100
18UMTC41	Part –III Core Subject Analytical geometry 3D and Vector calculus	1	5	5	25	75	100
18UMTC42	Statistics - I	1	5	5	25	75	100
18UPHA41	Part –III Allied Subject Allied Physics- IV Optics, Spectroscopy and Modern Physics	1	4	3	25	75	100
18UPHAP2	Allied Physics Practical -II	1	2	1	40	60	100
18UMTN41	Part –IV Non Major Elective Mathematics for Competitive Examination - II	1	2	2	25	75	100
18UEAG40- 18UEAG49	Part V- Extension Activities	1	-	1	100	-	100
Total		8	30	23	290	510	800

SEMESTER –V

Course code	Name of the course	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int	Ext	Total
18UMTC51	Part –III Core Subject Real Analysis	1	5	5	25	75	100
18UMTC52	Modern Algebra	1	6	5	25	75	100
18UMTC53	Statistics II	1	6	5	25	75	100
18UMTA51	Programming in C	1	5	5	25	75	100
18UMTE51 18UMTE52 18UMTE53	Differential Equations Fuzzy sets Astronomy	1	6	5	25	75	100
18UMTS51	Part IV Skill Subject Laplace Transforms & Fourier Series	1	2	2	25	75	100
Total		6	30	27	150	450	600

SEMESTER –VI

Course code	Name of the subject	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int	Ext	Total
18UMTC61	Part –III Core Subject Complex Analysis	1	5	5	25	75	100
18UMTC62	Linear Algebra	1	6	5	25	75	100
18UMTPR1	Project & Viva-voce	1	6	5	40	60	100
18UMTA61	Operations Research	1	5	5	25	75	100
18UMTE61 18UMTE62 18UMTE63	Graph Theory Stochastic Process Number Theory	1	6	5	25	75	100
18UMTS61	Part IV Skill Subject Programming in C++	1	2	2	25	75	100
Total		6	30	27	165	435	600

FIRST SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics) Part III : Core
Semester : I Hours : 06
Sub code : 18UMTC11 Credits : 04

DIFFERENTIAL CALCULUS

Course Outcomes

- CO1.** To develop problem solving skills
- CO2.** To familiarize the applications of differential calculus.
- CO3.** To explain about the nature and types of differential calculus.
- CO4.** To provides the capability of solving the Mathematical problems on skill development.

Unit -I:

Successive differentiation - n^{th} derivative – Standard results – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula.

Unit - II:

Maxima and Minima of two variables – Lagrange’s method of undetermined multipliers - Equations of tangent and normal at any point of the curve.

Unit - III:

Angle of intersection of curves – Sub tangent and Sub Normal - Curvature – Circle, radius and centre of curvatures - Cartesian formula for radius of curvature – The coordinates of the centre of curvature.

Unit - IV:

Envelopes - Evolute and involute – Radius of curvature in Polar co-ordinates- p-r equation – Pedal equation of curves .

Unit -V:

Meaning of the derivative – Geometrical interpretation – Meaning of the sign of the differential coefficient – rate of change of variable.

Text Book:

1. T.K.Manickavashagam Pillai and S.Narayanan, **Calculus, Volume I**, S.Viswanathan Publishers, Chennai, 1996.

Unit-I	–	Chapter 3, Sections: 1.1,1.2,1.3,1.4, 1.5 , 1.6, 2.1
Unit-II	–	Chapter 8, Sections: 4, 5 Chapter 9, Sections : 1.2, 1.3,
Unit–III	–	Chapter 9, Section: 1.4, Section 2, Chapter 10, Sections : 2.1, 2.2, 2.3, 2.4.
Unit-IV	–	Chapter 10, Sections : 1.1,1.2,1.3, 1.4, 2.5, 2.6, 2.7.
Unit- V	–	Chapter 4, Sections : 1, 2, 3.

Reference Books:

1. S.Arumugam and Isaac, **Calculus**, New Gamma Publishing House, Palayamkottai,2008.
2. Shanthi Narayan, **Differential Calculus**, S.Chand & Company Ltd , New Delhi,1979.
3. George B.Thomas, **Thomas' Calculus**, Maurice D.Weir and Joel Hass, Pearson Education Company, 12thEdition, 2015.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
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Class : B.Sc.,(Mathematics)

Part III : Allied

Semester : I

Hours : 4

Subject Code : 18UPHA11

Credits : 4

ALLIED PHYSICS– I
Mechanics, Properties of Matter and Relativity

Course Outcomes:

CO1: To understand the basics concepts of physics in everyday life.

CO2: To differentiate the three states of matter.

CO3: To understand all the phenomena are relative in nature.

CO4: To develop the skill in the area of properties of Matter.

Unit: I

Basic forces in nature – Central forces – Conservative – Non conservative force - Friction

Work – Work done by the variation force – Energy – Expression for kinetic energy –
Expression for potential energy – Power – Newton’s laws of motion – Collision – elastic
and Inelastic collision.

Unit: II

Kepler’s laws of planetary motion- Newton’s laws of gravitation – Mass and density of
Earth – Boy’s method for G – Compound pendulum - Expression for period -
Experiment to
find “g” - Variation of g with latitude, altitude and depth – Artificial Satellites.

Unit: III

Elasticity – Different moduli of Elasticity-Poisson’s ratio – Bending of beams –
Expression for bending moment – determination of Young’s modulus by uniform and
non uniform bending – Torsion – expression for couple per unit twist – Work done in
twisting – Rigidity modulus by torsion pendulum.

Unit: IV

Viscosity - Derivation of Poiseuille’s formula (analytical method) - Poiseuille’s method
for
determining coefficient of viscosity of a liquid – Equation of continuity - Bernoulli’s
theorem
– derivation – Applications of Poiseuille’s theorem (Venturimeter and Pitot tube).

Unit: V

Frames of reference – Inertial frames and non- Inertial frames -Galilean transformations
–

Michelson- Morley experiment – Interpretation of results – Postulates of special theory of Relativity – Lorentz transformation equations – Length contraction – Time dilation – Addition of velocities– Variation mass with velocity – Mass –energy equation

Text Book:

1. R.Murugesan **Mechanics, Properties of Matter and Sound**, Madurai first edition, June2016. [B.Sc. Ancillary Physics]

Unit – I : Page No 1-9, 11-15

Unit – II : Page No 46 – 58

Unit – III : Page No64 – 77

Unit – IV : Page No 83 – 93

2. R. Murugesan **Mechanics and Relativity, Properties of matter**, practical physics, Madurai, first edition , august 2006 [B.Sc Major Physics].

Unit –V: Page No 17-22, 30-32, 36-46, 48-56

Unit – I : Page No: 109, 90, 91

Reference Books:

1.S.L. Kakani, C.Hemrajani, S.Kakani, **Mechanics**, III edition , Viva Books Ltd, New Delhi, 2011.

2.Haliday Resnic, Jearl Walker, **Principles of Physics**, 9th Edition , Wiley India Pvt. Ltd, New Delhi, 2012.

3.D.S.Mathur, **Mechanics**, S.Chand and Co., New Delhi, 2008

4.Brijlal and N.Subramanyam, **Properties of matter**, S.Chand and Co., New Delhi, 2004



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
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Class : B.Sc(Mathematics)

Semester : I& II

Subject Code :18UPHAP1

Part III : Allied

Hours : 02

Credits : -

ALLIED PHYSICS PRACTICAL - I

Course Outcomes:

CO1: To create the practical knowledge in basic physics experiments.

CO2: To understand the bending of beam, compound pendulum and torsion pendulum.

CO3: To understand current conduction in electrical circuits.

CO4: To create skill in doing the experiment individually.

LIST OF EXPERIMENTS

Any 14 Experiments:

- | | |
|--|---------------------------------------|
| 1. Non –Uniform bending | – Optic lever |
| 2. Uniform bending | - (Pin & Microscope) |
| 3. Compound Pendulum | - Determination “g” |
| 4. Torsion Pendulum | –Determination of M.I |
| 5. Thermal conductivity of Bad conductor | - Lee’s disc |
| 6. Melde’s String | – Frequency of tuning fork |
| 7. Sonometer | - Verification of laws |
| 8. Calibration of low range Voltmeter | – Potentiometer |
| 9. Calibration of Ammeter | – Potentiometer |
| 10. Resistance and resistivity | – Potentiometer |
| 11. Comparison of Capacitances | – Spot Galvanometer method. |
| 12. Comparison of emf’s | - Spot Galvanometer method. |
| 13. Carey Foster Bridge | – Resistance & resistivity of a wire. |
| 14. Spectrometer | – Refractive index of a Prism |
| 15. Torsion Pendulum | -Determination of Rigidity modulus |
| 16. Co-efficient of Viscosity | – Stoke’s method. |



MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF MATHEMATICS
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Class	: B.Sc (Mathematics)	Part IV	: Skill
Semester	: I	Hours	: 02
Sub code	: 18UMTS11	Credits	: 02

NUMERICAL APTITUDE

Course Outcomes

- CO1:** To introduce concepts of Mathematics along with analytical ability.
- CO2:** To develop the computational skills needed.
- CO3:** To improve the ability to face the competitive examinations.
- CO4:** To face the Competitive Examination bravely in future on employability.

Unit -I:

Problems on ages.

Unit -II:

Profit and Loss

Unit - III:

Ratio and proportion.

Unit -IV:

Time and Work.

Unit- V:

Permutations and Combinations.

Text Book:

1. R.S.Aggarwal, **Quantitative Aptitude**, Revised and Enlarged Edition, S.Chand publication, New Delhi, Reprint 2009.

Unit I: Chapter 8 (Examples and Exercise first ten problems)

Unit II: Chapter 11 (Examples and Exercise first ten problems)

Unit III: Chapter 12 (Examples and Exercise first ten problems)

Unit IV: Chapters 15 (Examples and Exercise first ten problems)

Unit V: Chapters 30 (Examples and Exercise first ten problems).

Reference Books :

1. Abhigit Guha, **Quantitative Aptitude**, 4th Edition, Tata Mc Graw Hill Publication, New Delhi, 2011.
2. U.Mohan Rao, **Quantitative Aptitude**, Scitech Publications, Chennai, Reprint 2013.



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DEPARTMENT OF MATHEMATICS
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Class	: B.Sc (Mathematics)	Part IV	: Skill
Semester	: I	Hours	: 02
Sub code	:18UMTS12	Credits	: 02

TRIGONOMETRY

Course Outcomes

- CO1.** To familiarize the trigonometrical function
- CO2.** To develop the capability of finding standard expansions of Trigonometric function.
- CO3.** To introduce the various types of hyperbolic functions and its inverse.
- CO4.** To mold the students on skill development.

Unit- I

De Moivre's theorem for rational number.

Unit - II

Expression for Trigonometrical functions - $\sin n\theta$, $\cos n\theta$, $\tan n\theta$.

Unit - III

Expression for $\sin^n\theta$, $\cos^n\theta$ and Expression of $\sin \theta$, $\cos \theta$, $\tan \theta$ in powers of θ .

Unit - IV

Hyperbolic functions

Unit - V

Inverse hyperbolic functions

Text Book:

1. Dr. S. Arumugam, Isaac and Somasundaram, **Trigonometry and Fourier series**, New Gamma Publishing House, Tirunelveli, 1999.

Unit I : Section 1.1

Unit II : Section 1.2

Unit III : Section 1.3 & 1.4

Unit IV : Section 2.1

Unit V : Section 2.2

Reference Books :

1. S. Narayanan and T.K. Manicavachagom Pillai, S. Viswanathan, **Trigonometry (Printers & Publishers) Pvt. Ltd, (1997)**
2. S.L. Loney, **Plane Trigonometry-Part-I&II**(6th Edition), Arihant Publications, 2016.



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DEPARTMENT OF MATHEMATICS
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Class : B.Sc (Mathematics) **Part IV** :
Mandatory
Semester : I **Hours** : 02
Sub code : 18UEVG11 **Credits** : 02

ENVIRONMENTAL STUDIES

COURSE OUTCOMES	
CO1: To gain knowledge on the importance of environmental education and ecosystem.	
CO2: To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution	
CO3: To understand the various energy sources, exploitation and need of alternate energy resources. Disaster management To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence	
CO4: To make the student to understand the various pollution problems control mechanisms.	
UNIT I	: Environment and Earth: Environment – Meaning – Definition - Components of Environment – Types of Environment. Interference of man with the Environment. Need for Environmental Education. Earth – Formation and Evolution of Earth– Structure of Earth and its components – Atmosphere, Lithosphere, Hydrosphere and Biosphere. Natural Resources: Renewable Resources and Non-Renewable Resources. Natural Resources and Associated Problems. Use and Exploitation of Forest, Water, Mineral, Food, Land and Energy Resources.
UNIT II	: Ecology and Ecosystems: Ecology – Meaning - Definition – Scope – Objectives – Subdivisions of Ecology. Ecosystem –Concept - Structure - Functions – Energy Flow – Food Chain and Food Web – Examples of Ecosystems (Forest, Grassland, Desert, Aquatic).
UNIT III	: Biodiversity: Definition – Biodiversity at Global, National and Local Level. Values of Biodiversity – Threats to Biodiversity – Conservation of Biodiversity. Biodiversity of India: Biogeographical Distribution – Hotspots of Indian Biodiversity – National Biodiversity Conservation Board and Its functions. Endangered and Endemic Species of India
UNIT IV	: Pollution Issues: Definition – Causes – Effects and Control Measures of Air, Water, Soil, Marine, Noise, Thermal and Nuclear Pollutions. Global Issues: Global Warming and Ozone Layer Depletion. Future plans of Global Environmental Protection Organisations.
UNIT V	: Sustainable Development: Key aspects of Sustainable Development – Strategies for Sustainable Development - Agriculture – Organic farming – Irrigation – Water Harvesting – Water Recycling – Cyber Waste and Management. Disaster Management: Meaning – Types of Disasters - Flood and Drought – Earth quake and Tsunami – Landslides and Avalanches – Cyclones and Hurricanes – Preventions and Consequences. Management of Disasters -

Text Book:

Study Material for **Environmental Studies**, Mannar Thirumalai Naicker College, Pasumalai, Madurai – 625 004.

Reference Books:

1. Study Material for **Environmental Studies**, Publications Division, Madurai Kamaraj University, Madurai – 625 021.
2. R.C. Sharma and Gurbir Sangha, **Environmental Studies**, Kalyani Publishers, 1, Mahalakshmi Street, T.Nagar, Chennai – 600 017.
3. Radha, **Environmental Studies for Undergraduate Courses of all Branches of Higher Education, (Based on UGC Syllabus)**, Prasanna Publishers & Distributors, Old No. 20, Krishnappa Street, (Near Santhosh Mahal), Chepak, Chennai – 600 005.
4. S.N.Tripathy and Sunakar Panda, **Fundamentals of Environmental Studies**, Vrinda Publications (P) Ltd. B-5, Ashish Complex, (opp. To Ahicon Public School), MayurVihar, Phase-1, Delhi– 110 091.
5. G.Rajah, **Environmental Studies for All UG Courses, (Based on UGC Syllabus)**, Margham Publications, 24, Rameswaram Road, T.Nagar, Chennai – 600 017.

SECOND SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)	Part III : Core
Semester : II	Hours : 06
Sub code : 18UMTC21	Credits : 05

THEORY OF EQUATIONS AND ITS APPLICATIONS

Course Outcomes

- CO1** To familiarize with the theory of equations.
- CO2** To introduce the transformation of equations.
- CO3** To add the information about trigonometric and hyperbolic functions.
- CO4.** To develop the basic knowledge of application on mathematics.

Unit - I:

Theory of equations – Imaginary roots - Rational roots – Relation between the roots and coefficients – Symmetric functions of the roots.

Unit - II:

Sum of the power of the roots of an equation – Newton’s theorem – Transformations of equations – Roots Multiplied by a given number.

Unit - III:

Reciprocal roots – Reciprocal equations- standard forms to increase and decrease the roots of a given equations by a given quantity.

Unit - IV:

Removal of terms – Descarte’s rule of sign – Roll’s theorem (only statement) – Multiple roots- Strum’s theorem (only problems) – General solution of cubic equations – Cardon’s method.

Unit - V:

Approximate solutions of Numerical equations- Newton’s method – Horner’s method.

Text book:

1. S. Arumugam and Isaac, **Classical Algebra and Theory of Equations**, New Gamma Publishing House, Palayamkottai, 2016.

Unit I	: Page No: 08 – 31
Unit II	: Page No: 32 – 41 & 56 – 60
Unit III	: Page No: 42 – 56 & 60 – 74
Unit IV	: Page No: 74 – 100
Unit V	: Page No: 103 – 112

Reference books:

1. T.K .ManicavasagamPillai and S.Narayanan, **Algebra – Volume I**, S.Viswanathan Printers Publishers Pvt. Ltd, Chennai, 2007.



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Class : B.Sc.,(Mathematics)
Semester : II
Subject Code : 18UPHA21

Part III : Allied
Hours : 4
Credits : 3

ALLIED PHYSICS– II
Thermal Physics and Sound

Course Outcomes:

- CO1: To create the knowledge in heat conduction.**
CO2: To understand the thermal physics concepts.
CO3: To understand production and propagation of sound.
CO4: To develop the skill in the area of Thermal Physics and Sound.

Unit – I:

Radiation – Stefan’s law – Determination of Stefan’s constant by filament heating method – Solar constant – Water flow Pyroheliometer – Temperature of the sun – Solar spectrum – Energy distribution in black body spectrum – Planck’s law(no derivation) .

Unit – II:

Kinetic theory of gases – Mean free path – Transport phenomena – Expression for the coefficient of Diffusion, viscosity and thermal conductivity – Degree of freedom – Boltzman’s law of equipartition of energy – calculation of γ for mono atomic and diatomic gases.

Unit – III:

Thermodynamics – Zeroth law (statement only) - First, second and third laws of thermodynamics (statement only) – Entropy – change of entropy in Carnot’s cycle – Change of entropy in conversion of ice into steam – Joule Kelvin effect – super conductivity.

Unit – IV:

Simple harmonic motion – Composition of two S.H.M’s in a straight line - Composition of two S.H.M’s of equal time periods at right angles – stationary waves – Properties of stationary waves – Melde’s experiment for the frequency of electrically maintained tuning fork (transverse and longitudinal modes).

Unit – V:

Acoustics of buildings – Requirements of good auditorium – Ultrasonics – Production – piezo electric method – Detection – Kundt’s tube and piezo electric properties and application – Determination of velocity of ultrasonic waves in a liquid (ultrasonic diffracton).

Text Books:

1. R. Murugesan, **Thermal Physics**, Chennai, First Edition, June 2012. [B.Sc., Ancillary Physics]
Unit – I: 5.1 – 5.10.
Unit – II: 6.1 – 6.7, 6.9 – 6.11.
Unit – III: 7.5 – 7.7, 8.1, 8.5.
2. R. Murugesan, **Mechanics, Properties of Matter and Sound, Thermal Physics, Practical – I**, Chennai, First Edition, July, 2016.
Unit – IV: 6.1- 6.3, 6.7 – 6.9.
Unit – V: 6.11 - 6.12.

Reference Books:

1. Brijlal and N. Subramanyam, **Heat and Thermodynamics**, S.Chand and Co, New Delhi, 2004.
2. Ubald Raj and Jose Robin, **Ancillary physics**, Vol.II, Indra Publications, Bhopal, 2002.
3. D.Haliday, Resnick and J.Walker, **Fundamental of Physics**, 6th Edition, New Delhi, 2012.
4. R. Murugesan, **Heat and Thermodynamics**, S. Chand and Co, New Delhi, 2004.
5. Brijlal and N.Subramanyam, **A text book of Sound**, II Revised Edition, Vikas publishing Pvt. Ltd, New Delhi, 1995.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
 (For those who joined in 2018-2019 and after)

Class : B.Sc(Mathematics)
Semester : I& II
Subject Code : 18UPHAP1

Part III : Allied
Hours : 02
Credits : 01

ALLIED PHYSICS PRACTICAL – I

Course Outcomes:

- CO1: To create the practical knowledge in basic physics experiments.**
CO2: To understand the bending of beam, compound pendulum and torsion pendulum.
CO3: To understand current conduction in electrical circuits.
CO4: To create skill in doing the experiment individually.

LIST OF EXPERIMENTS

Any 14 Experiments:

- | | |
|--|---------------------------------------|
| 1. Non –Uniform bending | – Optic lever |
| 2. Uniform bending | - (Pin & Microscope) |
| 3. Compound Pendulum | - Determination “g” |
| 4. Torsion Pendulum | –Determination of M.I |
| 5. Thermal conductivity of Bad conductor | - Lee’s disc |
| 6. Melde’s String | – Frequency of tuning fork |
| 7. Sonometer | - Verification of laws |
| 8. Calibration of low range Voltmeter | – Potentiometer |
| 9. Calibration of Ammeter | – Potentiometer |
| 10. Resistance and resistivity | – Potentiometer |
| 11. Comparison of Capacitances | – Spot Galvanometer method. |
| 12. Comparison of emf’s | - Spot Galvanometer method. |
| 13. Carey Foster Bridge | – Resistance & resistivity of a wire. |
| 14. Spectrometer | – Refractive index of a Prism |
| 15. Torsion Pendulum | -Determination of Rigidity modulus |
| 16. Co-efficient of Viscosity | – Stoke’s method. |



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc (Mathematics)	Part IV	: Skill
Semester	: II	Hours	: 02
Sub code	: 18UMTS21	Credits	: 02

MS OFFICE

Course Outcomes

CO1 To introduce the basic concepts.

CO2 To improve the capability on DTP process.

CO3 To encourage the mail merge and sorting process.

CO4 To provide basic knowledge of computer for employability.

Unit - I:

MS-Word Introduction- Creating and Saving a Document – Page Setup-Print preview, Print, Edit-Redo, Cut, Copy, Paste, Find and Replace, Views-Normal, Print layout, Ruler, Header and Footer, Insert-Page number, Picture, Text Box, Word art.

Unit - II:

Format Menu (size, color, type), Bulleted numbering, Border and Shading, Columns and Change cases, Tools-Spelling and Grammar-Mail merge, Insert Table, Delete, Select, Split Columns and Rows and draw.

Unit - III:

Explanation of Excel page (Rows, Columns and Cells) -Entering Data, Usage of Formulae and Functions.

Unit -IV:

Creating an Excel Chart, Data Manipulation and Types of Functions.

Unit - V:

Creating a design template – Saving presentation – Existing Powerpoint – View, Insert, and Edit in presentation.

Text book:

1. C.Nellai Kannan, **MS Office**, Nels Publications, 3rd edition, Tirunelveli, 2004.

Unit I - Chapter 1 : Pages 5 - 43

Unit II - Chapter 2 : Pages 50 - 93

Unit III - Chapter 3 : Pages 105 -120 ,125 -135

Unit IV - Chapter 4 : Pages 152 -173

Unit V - Chapter 5 : Pages 177 - 196

Reference Books:

1. Sanjay Saxena, **A First course in Computers**, Vikas Publishing House Pvt Ltd Edition, New Delhi, 2003.
2. Vikas Gupta, **Comdex Computer Course Kit** , Dream Tech Press Edition, New Delhi, 2003.
3. WEBSITE : <https://www.free-computer-tutorials.net/word-2007.html>



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)
Semester : II
Sub code : 18UMTSP1

Part IV : Skill
Hours : 02
Credits : 02

MS OFFICE LAB

Course Outcomes

- CO1** To introduce the basic concepts.
- CO2** To improve the capability on DTP process.
- CO3** To encourage the mail merge and sorting process.
- CO4** To provide basic knowledge of computer for employability.

List of Programs

1. Design a document with at least two pages using MS word with different font style, different font sizes, header and footer, with page number.
2. Design an invitation with two column break, use word to insert picture, design border and shading.
3. Create a main document and database of addresses and merge them using Mail-merge tools.
4. Create a daily attendance sheet of a class room for a week with heading, day, period etc.
5. Create students mark list for three subjects and to list the result and rank by using string function and logical function.
6. Create a yearly budget of a company and create different types of chart for the data.
7. Create a slide show using blank presentation with at least 20 slides.
8. Present the college details or any publishing work using Auto content wizard.
9. Create a Seminar presentation using insert picture and sound.

Text book:

1. C.Nellai Kannan, **MS Office**, Nels Publications, 3rd edition, Tirunelveli, 2004.

Reference Books:

1. Sanjay Saxena, **A First course in Computers**, Vikas Publishing House Pvt Ltd Edition, New Delhi, 2003.
2. Vikas Gupta, **Comdex Computer Course Kit** , Dream Tech Press Edition, New Delhi, 2003.
3. WEBSITE : <https://www.free-computer-tutorials.net/word-2007.html>



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
 (For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)	Part IV : Mandatory
Semester : II	Hours : 02
Sub code : 18UVLG21	Credits : 02

VALUE EDUCATION

COURSE OUTCOMES	
<p>CO1: Clarifying the meaning and concept of value - value education.</p> <p>CO2: To inspire students to develop their personality and social values based on the principles of human values.</p> <p>CO3: Developing sense of Love, Peace and Brotherhood at Local, national and international levels.</p> <p>CO4: To enable the students to understand the social realities and to inculcate an essential value system towards building a health society</p>	
UNIT I	<p>: Values and The Individual: Values – Meaning – Definition – Importance – Classification of Values, Value Education – Meaning – Need for Value Education. Values and the Individual – Self-Discipline – Meaning – Tips to Improve Self-Discipline. Self-Confidence – Meaning - Tips to Improve Self-Confidence. Empathy – Meaning – Role of Empathy in motivating Values. Compassion – Role of Compassion in motivating Values. Forgiveness – Meaning - Role of Forgiveness in motivating Values. Honesty – Meaning – Role of Honesty in motivating Values. Courage – Meaning – Role of Courage in motivating Values.</p>
UNIT II	<p>: Religions and Communal Harmony: Religions – Meaning – Major Religions in India - Hinduism – Values in Hinduism. Christianity – Values in Christianity. Islam – Values in Islam. Buddhism – Values in Buddhism. Jainism – Values in Jainism. Sikhism – Values in Sikhism. Need for Religious Harmony in India. Caste System in India – Need for Communal Harmony in India. Social Justice – Meaning – Factors Responsible for Social Justice.</p>
UNIT III	<p>: Society and Social Issues: Society – Meaning – Values in Indian Society. Democracy – Meaning – Values in Indian Democracy. Secularism – Meaning – Values in Indian Secularism. Socialism – meaning – Values in Socialism. Social Issues – Alcoholism – Drugs – Poverty – Unemployment.</p>

UNIT IV	:	Human Rights and Marginalised People: Human Rights – Meaning – Problem of Violation of Human Rights in India – Authorities available under the Protection of Human Rights Act in India. Marginalised People like Women, Children, Dalits, Minorities, Physically Challenged – Concept – Rights – Challenges. Transgender – Meaning – Issues.
UNIT V	:	Social Institutions in Value Formation: Social Institutions – Meaning – Important Social Institutions. Family – Meaning – Role of Families in Value Formation. Role of Press & Mass Media in Value Formation – Role of Social Activists – Meaning Contribution to Society – Challenges.

Text Book:

Text Module for **Value Education**, Mannar Thirumalai Naicker College, Pasumalai, Madurai – 625 004

Reference Books:

1. Text Module for **Value Education**, Publications Division, Madurai Kamaraj University, Madurai – 625 021.
2. N.S.Raghunathan, **Value Education**, Margham Publications, 24, Rameswaram Road, T.Ngar, Chennai – 600 017.
3. Dr.P.Saravanan, and P.Andichamy, **Value Education**, Merit India Publications, (Educational Publishers), 5, Pudumandapam, Madurai-625001.

THIRD SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Programme : UG	Part III	: Core
Semester : III	Hours per week	: 05
Sub code : 18UMTC31	Credit	: 05

INTEGRAL CALCULUS

Course Outcomes

CO1: To give an idea about the properties of definite integrals.

CO2: To apply integral calculus to evaluate double and triple integrals.

CO3: To understand the basic concepts interchanging Cartesian to polar co-ordinates.

CO4: To understand the various properties of Beta and Gamma functions.

UNIT I

Integration of rational algebraic functions –Special cases – Integration of irrational algebraic functions – Properties of definite integrals.

UNIT II

Integration by parts– Reduction formulae for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\operatorname{cosec}^n x$, $\sin^m x \cos^n x$ – Bernoulli's formula.

UNIT III

Evaluation of double integral – Changing of order of integration– Double integral in Polar co– ordinates – Triple integral.

UNIT IV

Jacobian – Change of variables in the case of two variable and three variables – Transformation from Cartesian to polar coordinate – Transformation from Cartesian to spherical coordinates.

UNIT V

Properties – relation between Beta and Gamma functions – Recurrence formula.

Text Book:

- 1) Narayanan. S and Manickavasagam Pillai. T.K, Calculus Volume II , (2015)

Unit I : Chapter 1 : 7.3, 7.4, 7.5, 8, 11

Unit II : Chapter 1: 12,13,15.1

Unit III: Chapter 5 : 2.1, 2.2, 3.1, 4

Unit IV : Chapter 6: 1.1, 1.2, 2.1,2.2,2.3,2.4

Unit V: Chapter 7: 2.1, 2.2, 2.3, 3, 4, 5

Reference books:

1. Bali. N. P, **Integral Calculus**, Laxmi Publications, (1991), Delhi.
2. Arumugam. S and Isaac, **Calculus**, New Gamma Publishing House, 2008, Palayamkottai.
3. George B.Thomas, Maurice D.Weir and Joel Hass **Calculus** 12th Edition, Pearson Education, 2015.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
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Programme	: UG	Part III	: Core
Semester	: III	Hours per week	: 05
Sub code	: 18UMTC32	Credit	: 05

SEQUENCES AND SERIES

Course Outcomes

- CO1:** To learn about sequences through examples.
- CO2:** To introduce infinite series and alternative series.
- CO3:** To familiarize the application of series in Trigonometry.
- CO4:** To understand of how the elementary functions can be defined by power series, with an ability to deduce some of their easier properties.

Unit - I:

Sequences - Bounded Sequences – Bounded above Sequences– Bounded below Sequences- Monotonic Sequences - Monotonic Increasing Sequences - Monotonic decreasing Sequences.

Unit – II:

Convergent Sequences – limit of the sequence – Theorems - Divergent and Oscillating Sequences – Sequences diverging to ∞ - Sequences diverging to $-\infty$ - Finitely Oscillating Sequences -Infinitely Oscillating Sequences - Algebra of limits - Theorems.

Unit – III:

Subsequences – Limit points – Cauchy sequences – Theorems - The Upper and Lower limits of a sequence – Theorems and Problems .

Unit - IV:

Infinite series – Comparison test – Theorems and Problems.

Unit – V:

Kummer's Test –D' Alembert's ratio test –Raabe's Test – De morgan and Bertrand's test - Gauss's Test- Problems - Cauchy's Root test and Cauchy's Condensation test – Problems.

Text Book:

1. Arumugam.S and Issac, **Sequences and Series**, New Gamma Publishing House, 2003, Palayamkottai.

Unit I	Chapter 3: Section 3.1 to 3.3
Unit II	Chapter 3 Section 3.4 to 3.6.
Unit III :	Chapter 3 Section 3.9 to 3.12.
Unit IV	Chapter 4: Section 4.1 to 4.2
Unit V	Chapter 4: Section 4.3 & 4.4.

Reference Books:

1. Arumugam .S and Thangapandi Issac, **Classical Algebra**, New Gamma Publications, Edition 2003, Palayamkottai.
2. Chandra Sekara Rao. K and K.S.Narayanan, **Real Analysis**, Volume –I, Viswanathan. S Pvt.Ltd, 2008, Chennai.
3. Jain. M.L, Sequence & Series, Jeevanson’s Publications, 2016.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Programme	: B.Sc (Mathematics & Chemistry)	Part III	: Allied
Semester	: III	Hours per week	: 04
Sub code	: 18UPHA31	Credit	: 04

ALLIED PHYSICS - III
ELECTRICITY AND ELECTRONICS

Course Outcomes

CO1: To enable the students to understand the basic concepts of electricity and electronics.

CO2: To understand the Gauss's law, Kirchhoff's laws and torque.

CO3: To study diodes and Binary number system.

CO4: To analyse the types of oscillator.

Unit I:

Gauss's law – Proof – Applications – Electric field due to a charged sphere – Field near a charged conducting cylinder - Coulomb's theorem – Electric potential – Relation between electric potential and electric field – Capacitors –Expression for C of a parallel plate, spherical (outer sphere earthed) and cylindrical capacitors – Energy of a charged capacitor – Loss of energy due to sharing of charges between two capacitors.

Unit II:

Kirchhoff's laws – Application of Kirchhoff's laws to Wheatstone's network – Carey Foster's Bridge – Measurement of resistance and temperature coefficient of resistance – Principle of Potentiometer – Calibration of ammeter and voltmeter(low & high range) – Measurement of resistance using potentiometer.

Unit III:

Torque on a current loop – Mirror galvanometer, dead beat and ballistic galvanometers – Current and voltage sensitiveness using B.G – Experiments for charge sensitiveness – comparison of emf's and comparison of capacitors.

Electro motive force generated in a coil rotating in a uniform magnetic field – RMS and Mean values – LCR circuit -Series and parallel resonant circuits.

Unit IV:

Junction Diodes – Forward and reverse bias – Diode characteristics – Types of diodes (LED and Zener)-Bridge rectifier using Pi filter – Transistor – Characteristics(CE mode only) – Single transistor(CE) amplifier Frequency response - Hartley oscillator – OPAMP and its characteristics – OPAMP as adder and subtractor.

Unit V:

Decimal number system - Binary number system – Binary to decimal and decimal to binary conversions – Addition and subtraction of binary numbers – Logic circuits – Boolean algebra – Postulates and theorems of Boolean Algebra – De Morgan's theorem – OR, AND, NOT, NOR and NAND gates –NOR and NAND gates as universal building blocks - EX-OR gates.

Text Book:

1. Murugesan.R, **Electricity and Electronics**, S.Chand and Co, First Edition, June 2012, New Delhi.
Unit – I : 1.1 – 1.19
Unit – II : 2.1 – 2.10
Unit – III : 3.1 – 3.10, 3.11 – 3.16
Unit – IV : 4.1 – 4.18, 4.24, 4.25
Unit – V : 5.1 – 5.18

Reference Books:

1. Narayanamoorthy and Nagarathinam, **Electricity and Magnetism**, National Publishing Co, 1997
2. Sehgal, Chopra and Sehgal, **Electricity and Magnetism**, - Sultan chand and Sons, 1998, New Delhi.
3. Murugesan.R, **Electricity and Electromagnetism**, S.Chand and Co, 2004, New Delhi.
4. Brijlal and Subramaniam, **Electricity & Magnetism**, S.Chand and Co, 20th revised edition, 2007.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Programme	: B.Sc (Mathematics & Chemistry)	Part III	: Allied
Semester	: III & IV	Hours per week	: 02
Sub code	: 18UPHAP2	Credit	: 01

ALLIED PHYSICS PRACTICAL – II

Course Outcomes

CO1: To develop experimental knowledge by handling various apparatus

CO2: To know the various components and its important

CO3: To know the circuit connections and functioning of experiments.

CO4: To create interest to develop oscillatory circuit.

Any 14 experiments.

1. Mirror Galvanometer - Voltage and current sensitiveness
2. LCR – Series resonance - Determination of L & Q factor
3. Air wedge - Thickness of a wire
4. Dispersive power of a prism – Spectrometer
5. Grating N and λ by Normal incidence – Spectrometer
6. Newton's rings - Determination of radius of curvature
7. Bridge rectifier - Pi filter
8. Transistor characteristics - CE mode
9. Single stage transistor amplifier
10. Hartley oscillator
11. Logic gates – AND, OR, NOT - Truth table verification Using Discrete Components.
12. Logic gates – NAND, NOR - Truth table verification Using Discrete Components.
13. Zener diode characteristics and break down voltage
14. OP AMP as an adder and subtractor
15. Comparison of capacitances - Desauty's method using headphone
16. LCR – Parallel resonance.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Programme : UG	Part IV : NME
Semester : III	Hours per week : 02
Sub code : 18UMTN31	Credit : 02

MATHEMATICS FOR COMPETITIVE EXAMINATION – I

Course Outcomes:

CO1: To introduce concepts of Mathematics along with analytical ability.

CO2: To practice the mathematical formulas and methods

CO3: To develop the computational skills needed.

CO4: To improve the ability to face the competitive examinations.

Unit-I

Addition of matrices – Subtraction of matrices – Multiplication of matrices - Determinant.

Unit – II

Operation on numbers – Divisibility – Arithmetic Progression – Geometric Progression.

Unit – III

HCF Factorization method – Division method –Factorization method of finding LCM – Common Division method – Comparison of fractions.

Unit – IV

Concept of percentage- Results on population – Results on Depreciation.

Unit – V

Comparison of ratios - Compounded ratio - Variation.

Text Book:

Text Material will be supplied by the Department.

Reference books:

1. Aggarwal. R.S, **Quantitative Aptitude for Competitive Examinations**, S.Chand and Company Ltd, Reprint 2011, New Delhi.
2. Abhigit Guha, **Quantitative Aptitude**, fourth edition, Tata MC Graw Hill Publication, 2011, New Delhi.
3. Mohan Rao. U, **Quantitative Aptitude**, Scitech Publications, Reprint, 2013, Chennai.

FOURTH SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Programme	: UG	Part III	: Core
Semester	: IV	Hours per week	: 05
Sub code	: 18UMTC41	Credit	: 05

ANALYTICAL GEOMETRY 3D AND VECTOR CALCULUS

Course Outcomes:

CO1: To understand the concepts of equation of a plane, Straight line, Sphere,

CO2: To learn the basic concepts in vector differentiation.

CO3: To acquire the knowledge of Analytical geometry of three dimensions & vector calculus.

CO4: To introduce the application of double and triple Integration.

Unit – I

The plane – Angle between two planes – Length of perpendicular – Bisecting plane – Distance between two planes.

Unit –II

The straight line – Symmetric form – Image of a line about a plane – A plane and a straight line – Angle Between a plane and straight line, Coplanar lines – Shortest distance between two lines.

Unit –III

The Sphere – Equation of the sphere – Equation of the tangent plane – Simple problems.

Unit –IV

Vector Differentiation, Gradient – Divergence – Curl –Theorems.

Unit –V

Vector Integration – Line integrals– Surface integrals – Theorems of Green, Gauss and

Stokes (statements only) – Simple Problems.

Text Book :

1. Dr. Arumugam. S and A. Thangapandi Isaac, **Analytical Geometry of three Dimensions and Vector Calculus** , New Gamma Publications, Reprint 2017, Palayamkottai.
Unit I – Chapter 2 Full
Unit II – Chapter 3 : Section 3.1 and 3.2
Unit III – Chapter 4 : Full
Unit IV – Chapter 5 : Full
Unit V – Chapter 7 : Full

Reference books:

1. Manicka Vasagam Pillai and Natarajan, **Analytical Geometry of three Dimensions and Vector Calculus**, Viswanathan. S, Printers and Publishers Pvt. Ltd., Reprint 2001, Chennai.
2. Duraipandian.P, Laxmidurai pandian and Muhilan.D, **Analytical Geometry of two Dimensions**, Emerald Publishers, Reprint, 1985, Chennai.
3. Dr. Venkataraman, M.K and Mrs. Manorama Sridhar, Calculus and Fourier series, The National Publishing Company, Chennai.,



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF MATHEMATICS

(For those who joined in 2018-2019 and after)

Programme	: UG	Part III	: Core
Semester	: IV	Hours per week	: 05
Sub code	: 18UMTC42	Credit	: 05

STATISTICS – I

Course Outcomes

CO1: To develop skills in basic statistical concepts.

CO2: To introduce Correlation and Regression.

CO3: To learn about various techniques on curve fitting.

CO4: To imply all kinds of attributes in statistics.

Unit – I

Measures of averages – Arithmetic Mean - Median-Quartile Deviation – Mode- Geometric Mean – Harmonic Mean- Measures of dispersion – Standard Deviation – Skewness and Kurtosis based on moments.

Unit –II

Correlation - Correlation Coefficient.- Problems - Rank correlation Coefficient - Regression- Equation of Regression lines – Regression Coefficients – Angle between Regression lines.

Unit – III

Index numbers - Aggregate method – Average of price relatives method – Weighted Index numbers – Laspeyre’s Index number- , Paasche’s Index number- Marshall - Edgeworth ‘s Index number- Bowley’s Index number – Fisher’s Index number – Kelley’s Index number – Ideal Index number- Consumer Price Index numbers and Time series.

Unit –IV

Curve fitting –Principle of Least Squares- Fitting a Straight Line – Fitting a second degree parabola – Type of Curves of the form $y = bx^a$, $y = ab^x$, $y = ae^{bx}$.

Unit –V

Theory of attributes – Positive Class Frequencies – Negative Class Frequencies - Ultimate Class Frequencies - Consistency of Data – Independence and Association of Data – Coefficient of Association – Coefficient of Colligation.

Text Book:

1. Dr . Arumugam, S & Isaac, **Statistics**, New Gamma Publications, Reprint 2012.

Unit I - Chapter 2, 3, 4

Unit II - Chapter 6

Unit III - Chapter 9, 10

Unit IV - Chapter 5

Unit V - Chapter 8

Reference books:

1. Gupta. S.C, Kapoor.V.K, **Elements of Mathematical Statistics**, Sultan Chand and Sons Publications, 2001, New Delhi.
2. R.S.N.Pillai & Bagavathi, **Practical Statistics**, S.Chand & Company Pvt Ltd, Reprint 2010, New Delhi.
3. David Freeman, **Statistics**, Viva Book Publisher, 2010, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF PHYSICS
(For those who joined in 2018-2019 and after)

Programme	: B.Sc (Mathematics & Chemistry)	Part III	: Allied
Semester	: IV	Hours per week	: 04
Sub code	: 18UPHA41	Credit	: 03

ALLIED PHYSICS - IV

OPTICS, SPECTROSCOPY AND MODERN PHYSICS

Course Outcomes

CO1: To understand the basic concepts in optics.

CO2: To understand the properties of light like reflection, refraction, interference, diffraction and polarization

CO3: To study the infrared spectroscopy, Raman effect, Doppler Effect and fiber optic communication system.

CO4: To evaluate theory of relativity.

Unit I:

Deviation produced by thin lens – Focal length of two thin lenses in and out of contact – Cardinal points – Refraction through a thin prism – Dispersion – Dispersive power – Combination of thin prisms to produce (a) Deviation without dispersion and (b) Dispersion without deviation – Direct vision spectroscopy – Chromatic aberration in lenses – Spherical aberration in lenses – Theory of primary and secondary rainbows.

Unit II:

Photography – Photographic camera – Depth of focus – Photographic film.
Interference in thin films – air wedge – Newton's rings (reflected beam only) – Determination of wavelength.

Unit III:

Double refraction – Nicol prism – Construction, action and uses – Quarter wave plate (QWP) – Half wave plate (HWP) – Optical activity – Biot's laws – Specific rotatory power – Half shade polarimeter – Determination of specific rotatory power – Fibre optics – Light propagation in fibres – Fibre optic communication system – Advantages.

Unit IV:

Infra red radiations – Sources, properties and uses – Ultraviolet radiations – Sources, properties and uses – Planck's quantum theory – Raman effect – Experimental study of Raman effect (simple theory) - Quantum theory of Raman effect – Applications – Photo electricity – Laws of photo electricity – Photo electric cells – Types (Photo emissive, Photoconductive and Photovoltaic cells) and their uses – Applications of photo electric cells.

Unit V:

Michelson–Moreley experiment – Significance of the negative results – Postulates of special theory of relativity – Lorentz transformation equations - Length contraction – Time dilation – Variation of mass with velocity – Mass energy equivalence.

Text Book:

1. Murugesan.R, **Optics, Spectroscopy and Modern Physics**, S.Chand and Company Ltd, 2010, New Delhi.

Unit – I : 1.1 – 1.24

Unit – II : 2.1 – 2.10

Unit – III : 3.1 – 3.21

Unit – IV : 4.1 – 4.14

Unit – V : 5.1 – 5.11

Reference Books:

1. Kakani and Bhandari Sultan, **Optics and Spectroscopy**, Chand and Sons, 2004, New Delhi.
2. Brijlal and Subramanyam, **A Text book of Optics**, S.Chand and Co, 2004, New Delhi.
3. B.K.Sharma, **Spectroscopy**, GOEL Publishing House, 2006, Meerut.
4. R.Murugesan and Kiruthiga Sivaprasath, **Modern Physics**, S.Chand and Co, Sixteenth Edition, 2012, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Programme	: B.Sc (Mathematics & Chemistry)	Part III	: Allied
Semester	: III & IV	Hours per week	: 02
Sub code	: 18UPHAP2	Credit	: 01

ALLIED PHYSICS PRACTICAL – II

Course Outcomes

CO1: To develop experimental knowledge by handling various apparatus

CO2: To know the various components and its important

CO3: To know the circuit connections and functioning of experiments.

CO4: To create interest to develop oscillatory circuit.

Any 14 experiments.

1. Mirror Galvanometer - Voltage and current sensitiveness
2. LCR – Series resonance - Determination of L & Q factor
3. Air wedge - Thickness of a wire
4. Dispersive power of a prism – Spectrometer
5. Grating N and λ by Normal incidence – Spectrometer
6. Newton's rings - Determination of radius of curvature
7. Bridge rectifier - Pi filter
8. Transistor characteristics - CE mode
9. Single stage transistor amplifier
10. Hartley oscillator
11. Logic gates – AND, OR, NOT - Truth table verification Using Discrete Components.
12. Logic gates – NAND, NOR - Truth table verification Using Discrete Components.
13. Zener diode characteristics and break down voltage
14. OP AMP as an adder and subtractor
15. Comparison of capacitances - Desauty's method using headphone
16. LCR – Parallel resonance.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Programme	: UG	Part IV	: NME
Semester	: IV	Hours	: 02
Sub code	: 18UMTN41	Credit	: 02

MATHEMATICS FOR COMPETITIVE EXAMINATION - II

Course Outcomes:

CO1: To introduce concepts of Mathematics along with analytical ability.

CO2: To develop the computational skills needed.

CO3: To improve the ability to face the competitive examinations.

CO4: To familiarize the concepts of permutation and combination.

Unit-I

Cost Price- Selling price – Profit or Gain – Loss – Profit and Loss Percentage.

Unit – II

Alligation – Mean price - Rule of alligation.

Unit – III

Principal – Interest – Simple Interest – Compound Interest.

Unit – IV

Non Verbal Reasoning – Completion of Figures – Completion of Series.

Unit – V

Calendar – Leap Year – Non Leap Year – Number of Days between Dates

Text Book:

Text Material will be supplied by the Department.

Reference books:

1. Aggarwal. R.S, **Quantitative Aptitude for Competitive Examinations**, S.Chand and Company Ltd, Reprint 2011, New Delhi.
2. AbhigitGuha, **Quantitative Aptitude**, fourth edition, Tata MCGraw Hill Publication, 2011, New Delhi.
3. BS Sijwali, Indu Sijwali, **Non -Verbal Reasoning**, Arihant Publications (India) LTD., New Delhi.

FIFTH SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc (Mathematics)	Part III	:
Core			
Semester	: V	Hours	:
05			
Course Code	: 18UMTC51	Credits	:
05			

REAL ANALYSIS

Course Outcomes:

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

- CO1:** demonstrate the understanding of basic concepts of Real analysis. (K2)
- CO2:** determine whether subsets of a metric space are open, closed, complete, connected and/or compact. (K3)
- CO3:** examine whether a function on a metric space is continuous, discontinuous, or uniformly continuous. (K4)
- CO4:** comprehend arguments developing the theory behind real analysis (K2)
- CO5:** construct mathematical proofs of basic results in real analysis (K3)

Unit – I

Countable and uncountable sets –Holder’s and Minkowski’s inequalities – Metric space –open sets and closed sets.

Unit –II

Completeness – Cantor’s intersection theorem and Baire’s category theorem - Problems.

Unit –III

Continuity -- Homeomorphism -- Uniform continuity. Theorems and problems.

Unit –IV

Connectedness –Connected subsets of \mathbb{R} - Connectedness and continuity – Intermediate value theorem.

Unit –V

Compactness– Compact subsets of \mathbb{R} - Heine Borel Theorem - Equivalent characterization of compactness- Finite intersection property- Totally Bounded metric space – sub sequence – sequentially compact metric space - problems.

Text Book:

1. Dr.S.Arumugam, Mr. A. Thangapandi Isaac, Dr. A. Somasundaram, Modern Analysis, Yes Dee Publishing Pvt Ltd.

Unit I - Chapter 1: Sections 1.3 -1.5, Chapter 2: Sections 2.2, 2.5, 2.8

Unit II - Chapter 3: Full

Unit III - Chapter 4: sections 4.2 -4.4

Unit IV - Chapter 5: Full

Unit V - Chapter 6: Sections 6.2 – 6.4

Reference books:

1. Shanthi Narayan, Elements of Real Analysis, S.Chand and Company Ltd, New Delhi, Sixth Edition, Revised edition 1989.
2. Richard R. Goldberg, Methods of Real Analysis, Oxford and IBH Publishing Pvt. Ltd, New Delhi, 1970.
3. Goldberg .R – Methods of Real Analysis, Oxford and IBH Publishing Co., New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc (Mathematics)	Part III	: Core
Semester	: V	Hours	: 06
Course Code	:18UMTC52	Credits	: 05

MODERN ALGEBRA

Course Outcome:

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

CO 1: Demonstrate the basic concepts like sets, relations, definition of groups(K1)

CO 2: Explain the concepts of subgroups, cosets, isomorphism, rings (K2)

CO 3: Justify the results like isomorphism in various groups (K5)

CO 4: Apply the important theorems (K3)

CO 5: Examine the properties of various groups (K4)

Unit –I

Subgroups – Examples – Theorems on subgroups- Permutation groups – Cycles and transpositions – Even permutations – Theorems on Permutations - S_n and A_n - Cyclic groups- Definitions, Examples, Theorems

Unit –II

Order of an element – Generators – Number of generators of Cyclic groups - Cosets – Theorems on cosets, Lagrange's theorem, problems using Lagrange's Theorem – Euler's, Fermat's Theorems .

Unit –III

Normal subgroups – Theorems on Normal subgroups – Quotient group- Isomorphisms- Examples , theorems - Automorphism

Unit –IV

Homomorphisms – Types and examples – Theorems on Homomorphisms – Fundamental theorem of Homomorphism – Any infinite cyclic group is isomorphic to $(\mathbb{Z}, +)$ – Any finite group is isomorphic to $(\mathbb{Z}_n, +)$ – Cayley's Theorem-Rings – Definition and examples .

Unit- V

Elementary properties – Isomorphism types of rings – Integral domains, Fields – Zero divisors – Theorems on Integral domains and Fields, Characteristic of a ring.

Text Book:

1. Dr.S.Arumugam and Isaac, **Modern Algebra**, Scitech Publication, Chennai, Reprint, June 2019.

Unit I - Section 3.4 to 3.6

Unit II - Section 3.7 to 3.8

Unit III - Section 3.9 to 3.10

Unit IV - Section 3.11, Section 4.1

Unit V - Section 4.2 to 4.5

Reference books:

1. M.L Santiago, **Modern Algebra**, Tata MC Graw Hill Publication, New Delhi, 1988.
2. K.Sivasubramaniam, A.S.Kumaraswamy and K.Sitaraman, **Modern Algebra**, S.Chand and Company Ltd, New Delhi, 1979.
3. Basic Modern Algebra with Applications, **Adhikari**, MahimaRanjan, **Adhikari**, Avishek, Springer, 2014.

Percentage of change: 30%



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B. Sc (Mathematics)

Part III :

Core

Semester : V

Hours : 06

Course Code : 18UMTC53

Credits : 05

STATISTICS II

Course Outcomes:

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

CO 1: Remember and understanding of statistics and data analysis (K1, K2)

CO 2: Apply various types of distribution (K3)

CO 3: Analyze statistical techniques to interpret the data. (K4)

CO 4: Evaluate problems on test of significance and probability functions. (K5)

CO 5: Create sampling development and scientific attitude through Statistics. (K6)

Unit – I

Theory of probability – Sample space – Probability function – Conditional probability
– Boole’s inequality – Baye’s theorem – Problems.

Unit – II

Random variables – Distribution function – Discrete and Continuous random
variables – Probability density function – Mathematical expectation(one dimensional
only).

Unit –III

Moment generating function – Cumulants – Characteristic function- Theoretical
distribution – Binomial – Poisson – Normal.

Unit –IV

Test of significance of large samples.

Unit –V

Test of significance of small samples – t-test, F-test and Chi-square test.

Text Book:

1. Dr.S.Arumugam and Isaac, **Statistics**, New Gamma Publications, Palayamkottai, Reprint 2012.

Unit I - Chapter 11

Unit II - Chapter 12 : Section 12.1 to 12.4

Unit III - Chapter 12 : Section 12.5- 12.6 & Chapter 13

Unit IV - Chapter 14

Unit V - Chapter 15, 16

Reference Books:

1. T. Sankara Narayanan and A.Mangaldoss, **Statistics and its Application**, Preist Publications, New Delhi, 1994.
2. R.S.N.Pillai and Bagavathi, **Practical Statistics**, ,S.Chand and Company Pvt Ltd, New Delhi, 1987.
3. Bhat B.R, Srivenkataramana T and Rao Madhava K.S.(1996): **Statistics: A Beginner s Text, Vol. I**, New Age International (P) Ltd.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)
Semester : V
Course Code: 18UMTA51

Part III : Allied
Hours : 05
Credits : 05

PROGRAMMING IN C

Course Outcomes:

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

CO 1: Identify appropriate program concepts. (K1)

CO 2: Explain the concept of programming and pseudo codes (K2)

CO 3: Analyze problems, identify subtasks and implement them as functions/procedures.
(K4)

CO 4: Implement variables and looping techniques. (K5)

CO 5: Apply branching statement and iteration techniques to solve application programs. (K3)

Unit 1: Programming Fundamentals – program development life cycle – algorithm – flow chart – pseudo code

Unit 2: C character set – identifiers and keywords – declaration statement – data types – type quantifiers and type modifiers – difference between declaration and definition– variables and constants - structure of a C program – Executing a C program.

Unit 3: Expressions – Simple Expressions and compound expressions – classification of operators – combined precedence of all operators – reading strings – printing strings.

Unit 4: Statement – classification of statements – branching statements: if statement, if-else statement, nested if statement, nested if-else statements, switch statement, jump statement, goto statement, break statement, return statement

Unit 5: Iteration statement: counter-controlled loops, for statement, while statement, do-while statement, sentinel –controlled loops – nested loops- break and continue statements

Text book:

1. Anita Goel and Ajay Mittal, Computer fundamentals and programming in C, 2nd Edition, Pearson publication.

Unit 1: section 2.12 to 2.17

Unit 2: section 3.4 to 3.13 (excluding 3.10)

Unit 3: section 4.1 to 4.8

Unit 4: section 5.1 to 5.4

Unit 5: section 5.5 full.

Reference book:

1. E.Balagurusamy, Programming in ANSI C, sixth Edition, Tata McGraw Hill Publishing Company, Uttar Pradesh, 2005.
2. Byron Gottfried, Programming with C, Tata McGraw Hill, New Delhi, 2011
3. Yashavant Kanethkar, Let us C, BPB Publications, New Delhi, Jan 2010.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)
Semester : V
Course Code: 18UMTE51

Part III : Elective
Hours : 06
Credits : 05

DIFFERENTIAL EQUATIONS

Course Outcomes:

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

- CO 1:** Identify linear, nonlinear, partial and ordinary differential equations. **(K2)**
- CO 2:** Apply different methods for solving differential equations. **(K3)**
- CO 3:** Evaluate ordinary and partial differential equation. **(K5)**
- CO 4:** Convert different forms into standard forms. **(K4)**
- CO 5:** Solve different types of differential equations. **(K3)**

Unit –I

Exact differential equations of first order but of higher degree – Equations solvable for y – Equations solvable for x – Clairaut's form – Equation that do not contain x, y explicitly, Equation homogeneous in x and y .

Unit –II

Linear Equations with constant coefficients and variable coefficients - Equations reducible to the linear homogeneous equations.

Unit –III

Simultaneous Linear differential equations – Linear Equations of the second order – Reduction to the normal form – Change of independent variables – Variation of parameters.

Unit –IV

Partial differential equation of the first order – Formation of PDEs – Elimination of arbitrary constants and functions - Derivation of partial differential equation – Lagrange method of solving linear equations.

Unit – V

Standard forms – Equations reducible to the standard forms – Charpit’s method.

Text Book:

1. T.K.Manickavasagam Pillai and S.Narayanan, **Differential equations and its Applications**, S.Viswanathan Publication, Chennai, 2014.

Unit I - Chapter 1: Section 6.1, 6.3 and
Chapter 4: Section 1, 2, 3& 4

Unit II - Chapter 5: Section 4, 5 & 6

Unit III - Chapter 6: Section 5, 6 and
Chapter 8: Section 1, 2, 3, & 4

Unit IV - Chapter 12: Section 1, 2, 3& 4

Unit V - Chapter 12: Section 5, 6

Reference Books:

1. Dr. M.D. Raisinghania, **Advanced Differential Equations**, S.Chand and Company Pvt. Ltd, New Delhi, Reprint, 2012
2. Dr.S. Arumugam and Issac, **Differential equations and its Applications**, New Gamma Publications, Palayamkottai, 2011.
3. M.D.Raisinghania , Ordinary and Partial Differential Equations, S.Chand & Co



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc (Mathematics)	Part III	: Elective
Semester	: V	Hours	: 06
Course Code	: 18UMTE52	Credits	: 05

FUZZY SETS

Course Outcomes:

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

CO1: Remember and understand the basic concepts of fuzziness. **(K1, K2)**

CO 2: Prepare concepts in projection and extension of the fuzzy numbers **(K3)**

CO 3: Conclude the properties of fuzzy relations and fuzzy sets **(K4)**

CO 4: Importance of the multi valued logics values and fuzzy logic values **(K5)**

CO 5: Compose applications of fuzzy sets and its logics. **(K6)**

Unit – I

Introduction – concept of fuzzy set – relation between fuzzy sets – operations on fuzzy sets – properties of the standard operations – numbers associated with a fuzzy set – crisp sets associated with fuzzy set – fuzzy sets associated with a given fuzzy set.

Unit – II

Crisp relation - fuzzy relations – operations on fuzzy relations - α -cuts of a fuzzy relation – composition of fuzzy relation.

Unit – III

Projection of fuzzy relations - cylindric extension – cylindric closure – fuzzy relation on a domain.

Unit – IV

Compositions of Fuzzy Relations - Properties of the Min-Max Composition - Fuzzy Graphs - Special Fuzzy Relations.

Unit – V

Linguistic Variables - Fuzzy Logic - Classical Logics Revisited - Linguistic Truth Tables.

Text Book:

1. M. Ganesh, Introduction to fuzzy sets and fuzzy logic, PHI Learning Private Limited, New Delhi, 2009.

Unit 1: Chapter 6

Unit 2: 7.1 to 7.5

Unit 3: 7.6 to 7.9

2. H.-J. Zimmermann, Fuzzy Set Theory and Its Applications, Library of Congress Cataloguing-in-Publication Data, Fourth Edition.

Unit 4: Chapter 6: section 6.1 to 6.8

Unit 5: Chapter 9: section 9.1 to 9.3

Reference Books:

1. Klir.G, Yuan B.B. Fuzzy sets and Fuzzy Logic Prentice Hall of India private limited, 1997.
2. Rajasekaran. S. Vijayalakshmi Pai. G.A. “Neural Networks, Fuzzy Logic and Genetic Algorithms”, Prentice Hall of India Private Limited, 2003.
3. George J. Klir and Tina .A Folger – Fuzzy sets, uncertainty and Informations – Prentice Hall of India, 2003, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc. (Mathematics)	Part III	: Elective
Semester	: V	Hours	: 06
Course Code:	18UMTE53	Credits	: 05

ASTRONOMY

Course Outcome:

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

- CO 1:** Remember the daily and long-term motion of planets and others. **(K1)**
- CO 2:** Apply mathematical concepts in studying space objects. **(K3)**
- CO 3:** Analyze the concepts of the spherical, horizontal systems. **(K4)**
- CO 4:** Evaluate the Meridian system. **(K5)**
- CO 5:** Create the interest about astronomy. **(K6)**

UNIT I:

Sphere and related theorem – great circles and small circles- Axis and poles of a circle- Distance between two points on a sphere- angle between two circles – secondaries – Angular, radius or spherical radius – Related theorems (without proof)- Spherical figures – spherical triangle –polar triangle –Related theorems(without proof)- some properties of spherical triangles (without proof) – colunar and antipodal triangles – Examples.

UNIT II:

Relation between the sides and angles of a spherical triangle- Five parts formula – functions of half an angle- functions of half a side- Delambre's analogies and Napier's analogies- Right angled spherical triangle (without proof) – Theorem.

UNIT III:

Napier's rules – Spherical coordinates – Relation between spherical and rectangular coordinates (without proof) – General proof of the cosine formula- small variations – Formulae in plane trigonometry – Worked Examples (1-6).

UNIT IV:

Celestial sphere – Diurnal motion, Celestial axis and equator – cardinal points- First point of Aries and First point of Libra- Equinoxes and Solstices – Colures – Celestial Coordinates – Horizontal system – equatorial system.

UNIT V:

Meridian system – Ecliptic system – Different systems of co –ordinates in the same figure – Conversion of coordinates (without proof) – The relation between Right Ascension and Longitude of the sun –Trace the Changes in the coordinates of the sun in the course of a year – The longitude of the sun on the day – Worked Examples (1-4 problems only).

Text Book:

1. “Astronomy for Degree Students” by Kumaravelu and Susila Kumaravelu 1996, Reprint 2006.

Unit I: Chapter 1: Sections 1 to 19.

Unit II: Chapter 1: Sections 20 to31 (31 without proof).

Unit III: Chapter 1: Section 32 to 38(34 without proof)

Unit IV: Chapter 2: Sections 40 to 61.

Unit V: Chapter 2: Sections 62 to 68 (65 without proof)

Reference Books:

1. M.L.KHANNA, Spherical Astronomy Prakash printers, 1973.
2. George - O - Abell – Exploration of the Universe (Second Edition)
3. G V Ramachandran, Text Book of Astronomy, Mission Press, Palayamkottai, 1965



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc (Mathematics)	Part IV	: Skill
Semester	: V	Hours	: 02
Course Code:	18UMTS51	Credits	: 02

LAPLACE TRANSFORMS AND FOURIER SERIES

Course Outcome:

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

CO1: Learn Laplace transforms and understanding its inverse. **(K1, K2)**

CO2: Apply Laplace Transform to solve ordinary differential equation. **(K3)**

CO3: Solve problems in inverse Laplace transform. **(K3)**

CO4: Examine the Laplace transform in periodic function. **(K4)**

CO5: Evaluate the Fourier series and half range Fourier series. **(K5)**

Unit –I

Laplace Transforms –Definitions – Sufficient conditions for the existence of the Laplace transform – Laplace transform of periodic functions – Some general Theorems – Problems – Evaluation of integrals.

Unit –II

The Inverse Laplace Transforms – Problems –Results.

Unit –III

Solving ordinary differential equations with constant coefficients and variable coefficients – Simultaneous linear equations using Laplace Transforms – Solving certain equation involving integrals using Laplace Transforms.

Unit –IV

Fourier series –Trigonometric series – Even and Odd functions.

Unit – V

Half range Fourier cosine series and Fourier sine series.

Text Books:

1. S.Narayanan and T.K.Manicka Vasagam Pillay, **Differential equations and its Applications**, S.Viswanathan Publications , Chennai, 2006.
2. Dr.S. Arumugam and Issac, **Sequence & Series and Fourier Series**, New Gamma Publishing House, Palayamkottai, 2006.

Unit I (Book 1)	-	Chapter 9: Section 1 to 5
Unit II (Book 1)	-	Chapter 9: Section 6 to 7
Unit III (Book 1)	-	Chapter 9: Section 8 to 11
Unit IV (Book 2)	-	Chapter 6: Pg.No: 1 to 14
Unit V (Book 2)	-	Chapter 6: Pg.No: 15 to 20

Reference Books:

1. Dr. M.D. Raisinghania, **Advanced Differential Equations**, S.Chand and Company PVT.LTD, New Delhi, Reprint, 2012.
2. George yankovsky, **Differential and Integral Calculus (Volume II)**, MIR Publishers, Moscow, 1974.
3. Ray Hanna J., - **Fourier Series, Transforms and Boundary Value Problems**, Dover Publications, New York, 2008.

SIXTH SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)
Semester : VI
Course Code: 18UMTC61

Part III : Core
Hours : 05
Credits : 05

COMPLEX ANALYSIS

Course Outcome:

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

- CO 1:** List the basic concepts of analytic function and harmonic functions. **(K1)**
- CO 2:** Express analytic property, conformal mapping and identify singularities. **(K2, K3)**
- CO 3:** Examine the basic properties of singularities, convergence of power series. **(K4)**
- CO 4:** Choose the Cauchy's integral formula or integral theorem. **(K5)**
- CO 5:** Reduce the complex integration with the help of integral formula. **(K6)**

Unit – I

Continuous functions – Differentiability – Cauchy-Riemann Equations – Alternative forms of Cauchy-Riemann equations – Analytic functions – Harmonic functions –Milne-Thompson method.

Unit – II

Conformal mapping definition and examples – Elementary transformations: translation, rotations, magnification, inversion – Bilinear Transformation – cross ratio – Fixed points.

Unit – III

Cauchy's Integral formula – Maximum modulus theorem –Higher derivatives.

Unit – IV

Taylor's series – Maclaurin's series – Laurent's series – Zeros – Singularities – types of singularities – meromorphic function.

Unit – V

Residues – Cauchy's residue theorem – Evaluation of definite integrals of standard types – Jordan's lemma (without proof).

Text Book:

1. S. Arumugam, A. Thangapandi Isaac and A. Somasundaram, Complex Analysis, Scitech publications, 2019.

Unit – I: Chapter 2: Section 2.4 to section 2.9

Unit – II: Chapter 3: Section 3.0 to section 3.4

Unit – III: Chapter 6: Section 6.2 to 6.4

Unit – IV: Chapter 7

Unit – V: Chapter 8

References Books:

1. S.Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, New Delhi. 2000.
2. L.V Ahlfors, Complex Analysis, McGraw Hill Co., New York, 1988.
3. Ponnuswamy .S – “Foundations of Complex Analysis”, Narosa Publication House, New Delhi, II edition 2005.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc (Mathematics)	Part III	: Core
Semester	: VI	Hours	: 06
Course Code	: 18UMTC62	Credits	: 05

LINEAR ALGEBRA

Course Outcome:

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

- CO1:** Exhibit vector space, inner product space, span of a set and understand the fundamental theorem of homomorphism (K1, K2)
- CO2:** Characterize vector spaces and matrices. (K3)
- CO3:** Apply properties of matrices and vector space (K3)
- CO4:** Analyze orthogonality and bilinear forms (K4)
- CO5:** Reduce quadratic form into diagonal form. (K6)

Unit –I

Vector Spaces – Definition and examples – Subspaces – Linear Transformation – Fundamental theorem of Homomorphism.

Unit –II

Span of a set – Linear independence – Basis and Dimension – Rank and Nullity – Matrix and Linear Transformations.

Unit-III

Inner Product Spaces – Definition and examples – Orthogonality – Orthogonal complement.

Unit –IV

Theory of Matrices –Algebra of Matrices –Types –Inverse-Elementary Transformation- Rank of a Matrix– Simultaneous Linear equations – Characteristic equation and Cayley Hamilton theorem – Eigen values and Eigen Vectors.

Unit – V

Bilinear forms – Matrix of a Bilinear form – Quadratic forms – Reduction to Quadratic forms.

Text Book:

1. Dr.S.Arumugam and Issac A.T, **Modern Algebra**, Scitech Publications, Chennai, Reprint July 2014.

Unit I - Chapter 5: Section 5.0 to 5.3

Unit II - Chapter 5: Section 5.4 to 5.8

Unit III - Chapter 6: Section 6.0 to 6.3

Unit IV - Chapter 7: Section 7.0 to 7.8

Unit V - Chapter 8: Section 8.0 to 8.2

Reference Books:

1. Leadership Project Committee, University of Bombay, **Text book of Algebra**, Tata McGraw Hill Publication, New Delhi, 1985.
2. V.Krishnamurthy, V.P.Mainra & J.L.Arora, **An Introduction to Linear Algebra**, Affiliated East – West press Pvt Ltd, New Delhi, 1990.
3. Manicavasagam Pillai .T.K and others – **Modern Algebra**, S. Viswanathan Publishers, Chennai 1993.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)
Semester : VI
Course Code : 18UMTPR1

Part III : Core
Hours : 06
Credits : 05

PROJECT AND VIVA

Course Description

The Project is conducted by the following Course Pattern.

Internal

Presentation	}	40
Submission		

External

Project Report	}	60
Viva Voce		

Total	- 100
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MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)
Semester : VI
Course Code: 18UMTA61

Part III : Allied
Hours : 05
Credits : 05

OPERATIONS RESEARCH

Course Outcome:

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

CO1: Illustrate linear problem, special forms and game theory. (K2)

CO2: Evaluate game theory and linear problems. (K5)

CO3: Compare different types of methods in solving linear problem. (K4)

CO4: Solve linear programming problem. (K3)

CO5: Design real life problem into a linear problem. (K6)

Unit –I

Linear Programming Problem – Formulation of LPP. Mathematical form – Solution by Graphical Method, The Simplex method and Method of penalty (Big M Method only).

Unit –II

Duality – Dual simplex method- Problems.

Unit –III

Transportation problem – Mathematical form – Initial solutions by all methods – MODI method for both balanced and unbalanced TP- The assignment problems.

Unit –IV

Game theory – Two person zero sum game – saddle point – Game with saddle point – Solution of game by using formula, graphical method, method of dominance and LPP method.

Unit –V

Sequencing –Replacement problem.

Text Book:

1. Kanti Swarup , P.K. Gupta and Man Mohan, **Operations Research** , Sultan Chand and Sons Publications, New Delhi, Reprint 2006.

Unit I - Chapter 2 Section 2.1, 2.2
Chapter 3 Section 3.1 to 3.5
Chapter 4 Section 4.1 to 4.4

Unit II - Chapter 5: Section 5.1 to 5.4 and 5.7

Unit III - Chapter 10: Section 10.1 to 10.5, 10.8 to 10.11 and 10.14
Chapter 11: Section 11.1 to 11.4

Unit IV - Chapter 17: Section 17.1 to 17.7

Unit V - Chapter 12: Section 12.1 to 12.5
Chapter 18: Section 18.1 to 18.3

Reference Books:

1. Dr.S.Arumugam and ISAAC, **Topics in Operations Research -Linear Programming**, New Gamma Publishing House, Palayamkottai, June 2012.
2. P.R.Vital and V.Malini, **Operations Research**, Margham Publications, Chennai, 2002.
3. Hamdy A. Taha, - **Operations Research, an Introduction**, 8th Ed., Prentice – Hall India, 2006.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc (Mathematics)	Part III	: Elective
Semester	: VI	Hours	: 06
Course Code	: 18UMTE61	Credits	: 05

GRAPH THEORY

Course Outcomes

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

CO1: Demonstrate the basic concepts of graph theory. (K2)

CO2: Develop mathematical proofs in graph theory. (K3)

CO3: Examine types of graph and finding its index. (K4)

CO4: Present various graph models. (K5)

CO5: Build mathematical models using graph theory. (K6)

Unit –I

Graphs- Degrees – Sub graphs, Isomorphism, Ramsey numbers – Independent sets and Coverings –Matrices of graphs - Operation on graphs.

Unit –II

Degree sequences – Graphic sequences- Walks, Trails and Paths – Connectedness and Components – Blocks- Connectivity.

Unit –III

Eulerian graphs – Hamiltonian graphs – Trees – Characterization of trees – Centre of a tree – Matching – Matching in bipartite graphs.

Unit –IV

Planar graph and properties – Characterization of Planar graphs – Thickness – Crossing numbers and Outer planarity.

Unit –V

Chromatic number and Chromatic index – Five colour theorem and Four colour theorem - Chromatic polynomial.

Text Book:

1. Dr.S.Arumugam and S.Ramachandran, Invitation to Graph Theory, Scitech Publication, Chennai, 2015.

Unit I - Chapter 2: Section 2.1 to 2.6 & 2.8 to 2.9

Unit II - Chapter 3, 4

Unit III - Chapter 5, 6 & 7

Unit IV - Chapter 8

Unit V - Chapter 9

Reference Books:

1. Harry, Graph Theory, Narosa Publishing House, New Delhi, 2001.
2. S.K.Yadav, Elements of Graph Theory, Ane Books Private Ltd, New Delhi, 2010.
3. Narasingh Deo – Graph theory with application to engineering and computer science, Prentice – Hall of india pvt. Ltd., New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class : B.Sc (Mathematics)
Semester : VI
Course Code: 18UMTE62

Part III : Elective
Hours : 06
Credits : 05

STOCHASTIC PROCESS

Course Outcomes:

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

CO1: List the definition of Markov chain and random walk. (K2)

CO2: Illustrate Stochastic Process, Markov Process. (K3)

CO3: Evaluate the transition probability matrices. (K4)

CO4: Justify the type of Markov Chain. (K5)

CO5: Model the concepts and theorems for real life problems (K6)

Unit –I

Stochastic Processes – types – Stationary Processes –examples - Ergodicity

Unit –II

Discrete Time Markov Chain – Transition Probabilities – Chapman – Kolmogorov equation – Classification of States – Limit Theorems for Markov Chains.

Unit –III

Stationary Distribution – Special Chains and Foster Type Theorems – Theorems Regarding Finite Markov Chains – Methods of Evaluation of the n-step Transition Probability

Unit –IV

Random walks- Types – Sequential Analysis – Wald’s Equation and Wald’s Identity- Fluctuation Theory.

Unit- V

Continuous Time Discrete State Markov Process – Transition Function –
Kolmogorov Differential Difference Equation- Birth and death Process –
Yule's Process

Text Book:

1. Introduction to Stochastic Processes, **A.K.BASU**, Narosa Publishing House, New Delhi

Unit I: Section 1.1-1.3

Unit II: Section 2.1-2.4

Unit III: Section 2.5-2.8

Unit IV: Section 3.1-3.4

Unit V : Section 6.1-6.6

Reference Books:

1. Stochastic Process, **J.Medhi** ,Wiley Eastern Company ,New Delhi,1987.
2. Basic Stochastic Processes, **Zdzistaw Brzeniak and Tomasz Zastawniak**, Springer International Edition, New Delhi ,1999.
3. Essentials of Stochastic Processes, **Rick Durrett**, Springer, 1999.

Percentage of change: 100%



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DEPARTMENT OF MATHEMATICS
(For those who joined in 2018-2019 and after)

Class	: B.Sc (Mathematics)	Part III	: Elective
Semester	: VI	Hours	: 06
Course Code	: 18UMTE63	Credits	: 05

NUMBER THEORY

Course Outcomes:

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

CO1: Explain the basic concepts of numbers (K2)

CO2: Solve congruence and number problems. (K3)

CO3: Apply theoretical concepts in number theory (K3)

CO4: Examine the divisibility using several methods (K4)

CO5: construct mathematical proofs of basic results in number theory (K3)

Unit I :

Early Number theory- The division Algorithm-The g.c.d-The Euclidean algorithm

Unit-II

The fundamental Theorem of arithmetic- The sieve of Eratosthenes –The Goldbach Conjecture

Unit-III

Basic properties of Congruences-special divisibility test - linear congruences.

Unit-IV

Fermat's Factorization method – The Little theorem -Wilson's theorem

Unit-V

The sum and number of divisors-The mobious inversion formula- The greatest integer function

Text Book:

1. Elementary Number Theory by David M.Burton ,TATA Mc Graw-Hill Ltd Edition :
6th edition

Unit-I : Chapter 1: Sec 1.3

Chapter 2: Sec 2.1, 2.2.

Unit-II : Chapter 3: Sec 3.1 to 3.3

Unit-III : Chapter 4: Sec 4.2 to 4.4

Unit-IV : Chapter 5: Sec 5.2 to 5.4

Unit-V : Chapter 6: Sec 6.1 to 6.3

Reference Books:

1. An Introduction to Theory of Numbers: Niven and Zuckermann Publishers
Wiley Eastern Ltd Edition/Year: 13rd Edition / 1972.
2. Introduction to Analytic Number Theory by “Tom .M.Apostal”
3. Elements of Number Theory by Kumaravelu and Sucila Kumaravelu, 2002.



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DEPARTMENT OF MATHEMATICS
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Class	: B.Sc (Mathematics)	Part IV	: Skill
Semester	: VI	Hours	: 02
Course Code:	18UMTS61	Credits	: 02

Programming in C++

Course Outcomes:

At the end of the course the students can able to

CO1: Demonstrate how C++ improves C with object-oriented features. **(K2)**

CO2: Write inline functions for efficiency and performance. **(K3)**

CO3: Make use of constructors and member functions. **(K3)**

CO4: Differentiate Overload functions and operators in C++. **(K4)**

CO5: Design C++ classes for code reuse. **(K5)**

Unit - I

Objects Oriented Programming - Structure of C++ program – Basic data type – User defined data type -Derived data type.

Unit - II

Operators in C++ - Control structures - Functions - Inline functions - Default arguments – Function overloading.

Unit - III

Class- Creating objects – Accessing class members- Defining member function - Static data members- Static member function.

Unit - IV

Friend function – Constructors – Destructors – Operator overloading – Rules for operator overloading.

Unit - V

Inheritance – Defining Derived classes – Single inheritance – Multilevel inheritance – Multiple Inheritance – Hierarchical inheritance - Hybrid Inheritance.

Text Book:

1. E. Balagurusamy, **Programming with C++**, Tata McGraw Hill, New Delhi, Fifth Edition, 2011.

Unit I	-	Chapter 1: Section	: 1.5
		Chapter 2: Section	: 2.6
		Chapter 3: Sections	: 3.2 -3.6, 3.8.
Unit II	-	Chapter 3: Sections	: 3.14, 3.15, 3.25
		Chapter 4: Section	: 4.2, 4.6, 4.7, 4.10
Unit III	-	Chapter 5: Sections	: 5.3, 5.4, 5.11, 5.12
Unit IV	-	Chapter 5: Sections	: 5.15
		Chapter 6: Sections	: 6.2, 6.11
		Chapter 7: Sections	: 7.2, 7.8
Unit V	-	Chapter 8: Sections	: 8.2, 8.3, 8.5, 8.6, 8.7, 8.8

Reference Books:

1. Bjarne Stroustrup, **The C++ Programming Language**, Addison-Wesley, New York, 1999.
2. Robert Lafore, **Object-Oriented Programming in Microsoft C++**, Galgotia Publications, New Delhi, 2000.
3. D.Ravichandran, **Programming with C++**, Tata McGraw Hill Education (India) Private Limited, New Delhi, Sixth Reprint, 2005.