VIVEKANANDA COLLEGE

College with Potential for Excellence

Residential & Autonomous – A Gurukula Institute of Life-Training

Re-accredited (3rd Cycle) with 'A' Grade (CGPA 3.59 out of 4.00) by NAAC

Affiliated to Madurai Kamaraj University

(Managed by Sri Ramakrishna Tapovanam, Tirupparaitturai, Trichy)

TIRUVEDAKAM WEST, MADURAI DISTRICT– 625 234

www.vivekanandacollege.ac.in

DEPARTMENT OF MATHEMATICS

B.Sc. MATHEMATICS

Choice Based Credit System

&

Learning Outcomes based Curriculum Framework (LOCF)

(For those students admitted during the Academic Year 2021-22 and after)

Vision

To raise a battalion of Mathematics graduates equipped with logical thinking and tender heart to serve our motherland as potential leaders in the manifold of national effort.

Mission

Enriching the mental, emotional and intellectual facets of mathematics students to cope up with any career that they choose and to strive to attain perfection in life.

About the Programme

Mathematics was taught as a subject in Pre–university classes from 1971 onwards – that was the year the college started functioning. Mathematics as an Ancillary subject was offered from the inception of B.Sc. Physics degree that is from the year 1973-74. From 1980-81 onwards B.Sc Degree in Mathematics major was offered and so Mathematics department became a full-fledged one. The college became autonomous in June 1987. So the department had freedom to chart its own course. Syllabus was framed in 1987 and updated periodically to cater to the career needs of the students. But while framing and updating the syllabus, Mathematics department has always kept in mind the main stake holders are rural students. So, fundamental Mathematics was always a part of the syllabus. When the need arose Computer oriented papers, Competitive mathematics, Operations research, Vedic mathematics, Value education, Environmental science etc. were also incorporated in the syllabus.

The department also did not fall back in repaying its social obligations. Our students, guided by the department teachers, become resource persons to teach mathematical concepts, Vedic maths, yoga etc. to the school students. Learning becomes easier by laboratory activities and by building mathematical models. Our student's practice this and their innovations are exhibited and explained in the three day Mathematics Exhibition for Rural Masses conducted once in 2 years. Our students are encouraged to participate enthusiastically in all the college endeavors and activities like NSS, NCC, controlling the public during functions and festival times, election duties, temple cleanliness etc.

Programme Educational Objectives (PEOs)

The objectives of this programme is to

PEO 1: Apply and advance the knowledge and skills acquired, to become a creative professional in their chosen field.

PEO 2: Discuss the multidisciplinary knowledge through industrial visit and providing a sustainable competitive edge in meeting the industry needs.

PEO 3: Perceive to become an eminent Mathematician with Excellent Employability and Research Skill.

PEO 4: Develop confidence to appear for Competitive examinations and will occupy higher posts in administrative level.

PEO 5: Expose them to various contemporary issues which will enable them to becomeethical and responsible towards themselves, co-workers, the Society and the Nation.

Programme Learning Outcomes (PLOs)

The Objective of this Programme is to

PLO 1: Provide a thorough Disciplinary Knowledge and Critical Thinking

PLO 2: Offer Effective Communication and Digital Literacy

PLO 3: Demonstrate a Social Interaction

PLO 4: Utilize Effective Citizenship

PLO 5: Apply Ethics and Values

PLO 6: Provide Environment and Sustainability

PLO 7: Make use of Self –directed and life – long learning

Programme Specific Outcomes (PSOs)

PSO1: Demonstrate basic manipulative and calculative skills in Trigonometry, geometry andCalculus.

PSO2: Read, analyzes and judge the validity of mathematical arguments.

PSO3: Students will be able to communicate mathematical ideas both orally and in writing.

PSO4: Display mastery of basic computational skills and recognize the appropriate use oftechnology to enhance those skills.

PSO5: Investigate and apply mathematical models in a variety of contexts related to science,technology, business and industry.

Graduates Attributes (GA)

GA 1: To acquire the knowledge to apply analytical and theoretical skills to model and solve mathematical problems.

GA 2: To provide sufficient knowledge on computer skills through MS office, C, C++ andmany innovative and modern subjects in Mathematics

GA 3: To apply the critical thinking ability to carry out extended investigation and innovation of mathematical formulations.

GA 4: To recognize connections between different branches of mathematics and appreciatethe connections between theory and applications.

GA 5: To understand and apply mathematical concepts in various contexts related to science, technology, business, and industry.

Mapping of PEO with PLO

	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
PLO 1	3	3	3	9	9
PLO 2	9	3	9	1	1
PLO 3	1	1	3	1	3
PLO 4	1	1	1	1	3
PLO 5	3	3	9	3	9
PLO 6	1	1	1	3	3
PLO 7	1	3	3	1	9

Mapping of PLO with GA

	GA 1	GA 2	GA 3	GA 4	GA 5
PLO 1	9	3	9	1	1
PLO 2	1	3	3	3	9
PLO 3	1	1	3	3	9
PLO 4	1	1	1	1	3
PLO 5	1	1	1	1	9
PLO 6	3	3	1	1	3
PLO 7	9	9	1	3	9

Assessment

Under Graduate Programmes - Question Paper Pattern for Both CIA&End Semester Examinations

With Effect From: 2018-19 onwards

Part I (Tamil / Sanskrit/Hindi) and Part II English

OBE Syllabus UG: Section A – Remembering (K1)
Section B – Remembering (K1)
Section C – Understanding (K2)
Section D – Applying (K3)

CIA Test Question Paper Pattern (UG) – 3 Tests per Semester – 2 Hours

Section - A: MCQs (Compulsory)	10 X 1 =10 Marks
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (3 out of 5)	3 X 6 = 18 Marks
Section - D: LA (1 out of 2)	1 X 12 =12 Marks

Total	**50 Marks**

End Semester Examinations Question Paper Pattern (UG) – 3 Hours

Section - A: MCQs	10 X 1 =10 Marks**(From Question Bank given by the Course Teacher)**
Section - B: VSA (5 out of 7)	5 X 2 =10 Marks
Section - C: SA (Either-or)	5 X 5 = 25 Marks
Section - D: LA (3 out of 5)	3 X 10 =30 Marks

Total	**75 Marks**

Part III (Core, Allied &Elective)

CIA Test Question Paper Pattern (UG) – 3 Tests per Semester – 2 Hours

Section - A: MCQs (Compulsory)	10 X 1=10 Marks
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (3 out of 5)	3 X 6 = 18 Marks
Section - D: LA (1 out of 2)	1 X 12=12 Marks

Total	**50 Marks**

End Semester Examinations Question Paper Pattern (UG) – 3 Hours

Section - A: MCQs	10 X 1 =10 Marks**(From Question Bank given by the Course Teacher)**
Section - B: VSA (5 out of 7)	5 X 2 =10 Marks
Section - C: SA (Either-or)	5 X 5= 25 Marks
Section - D: LA (3 out of 5)	3 X 10 =30 Marks

Total	**75 Marks**

Part IV (SBS-Skills Based Course)

CIA Test Question Paper Pattern (UG) – 3 Tests per Semester at Department Level– 1 Hour

Section - A: MCQs	5 X 1 = 5Marks
Section - B: VSA (2 out of 4)	2 X 2 = 4 Marks
Section - C: SA (1 out of 2)	1 X 6 = 6 Marks
Section - D: LA (1 out of 2)	1 X 10=10 Marks

Total	**25 Marks**

For competitive exam questions Pattern (OMR with 4 options will be used) 50X1=50 (**1 hour**)

End Semester Examinations Question Paper Pattern (UG) – 2 Hours

Section - A: MCQs	10 X 1 = 10 Marks**(From Question Bank given by the Course Teacher)**
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (Either-or)	3 X 9 = 27 Marks
Section - D: LA (2 out of 4)	2 X 14= 28 Marks

Total	**75 Marks**

For competitive exam questions Pattern (OMR with 4 options will be used) 75X1=75 (**2 hours**)

Part IV (Non Major Elective, Value Education and Environmental Studies)

CIA Test Question Paper Pattern (UG) – 1 Test per Semester – 2 Hours

Section - A: MCQs	10 X 1 = 10 Marks
Section -B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (3 out of 5)	3 X 6 = 18 Marks
Section - D: LA (1 out of 2)	1 X 12= 12 Marks

Total	**50 Marks**

End Semester Examinations Question Paper Pattern (UG) – 2 Hours

Section - A: MCQs	10 X 1 = 10 Marks**(From Question Bank given by the Course Teacher)**
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (Either-or)	3 X 9 = 27 Marks
Section - D: LA (2 out of 4)	2 X 14= 28 Marks

Total	**75 Marks**

Part V (End Semester Examinations only)

EXTENSION ACTIVITIES

End Semester Examinations Question Paper Pattern (UG) – 2 Hours

Section - A: MCQs	10 X 1 = 10 Marks
Section - B: VSA (5 out of 7)	5 X 2 = 10 Marks
Section - C: SA (Either-or)	3 X 9 = 27 Marks
Section - D: LA (2 out of 4)	2 X 14= 28 Marks

Total	**75 Marks**

Part VI (End Semester Examinations only) UG & PG

1. General Knowledge **– (One Examination per Semester– UG & PG) – 1 Hour**

Section – A: MCQs 50 X 1 =50 Marks (**OMR Sheet**)

Total **50** Marks

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2. Wit for Wisdom and Humour for Health – (One Examination per Year – UG & PG) – 1 Hour

Section – A: LA (5 out of 7) 5 X 20= 100 Marks

Total **100** Marks

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3. Spiritual Education– (One Examination per Year – UG & PG) – 1 Hour

Section – A: VSA 20 X 2= 40 Marks
Section – B: SA (3 out of 5) 3 X 5 = 15 Marks
Section –C: LA (2 out of 4) 2 X 10 =20 Marks

Total **75** Marks

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4. Physical Training– (One Examination for III Year UG & II Year PG Students) – 1 Hour

Section - A: MCQs 10 X 1 = 10 Marks
Section – B: SA ((Either-or)) 4 X 5 = 20 Marks
Section – C: LA (2 out of 4) 2 X 10 =20 Marks

Total **50** Marks

Continuous Internal Assessment (CIA) - Distribution of Marks

	UG		**PG**	
Part - I, II Part - III	Test (Best Two)	15 Marks	Test (Best Two)	15 Marks
	Cycle Test (5 × 1 = 5)	5 Marks	Quiz / Seminar	5 Marks
	Assignment (5 × 1 = 5)	5 Marks	Assignment	5 Marks
	Total	**25 Marks**	**Total**	**25 Marks**
Part- IV	Test (Best Two for SBS)	20 Marks		
	Assignment	5 Marks		
	Total	**25 Marks**		

Abbreviations:

MCQs: Multiple Choice Questions
SA : Short Answer
VSA: Very Short Answer
LA : Long Answer

DEPARTMENT OF MATHEMATICS
SCHEME OF EXAMINATIONS
Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)
(For those students admitted during the Academic Year 2021 - 22 and after)
FIRST SEMESTER

Part	Study Component	Course Code	Course Title	Hours	Credits	CIA Marks	ESE Marks	Total Marks
I	Tamil	P1LT11	Kavithai Ilakkiyaamum Kathai Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS11	Fundamental grammar and History of Sanskrit Literature –I					
II	English	P2LE11	English for Basic Communication Skills	6	3	25	75	100
III	Core Course	05CT11	Algebra and Trigonometry	5	4	25	75	100
	Core Course	05CT12	Differential Calculus	5	4	25	75	100
	AEC	06AE01	AEC Physics – I	4	4	25	75	100
	AEC		AEC Physics Practical	2	-	-	-	-
IV	GEC	05GE11	Fundamentals of Mathematics	2	2	25	75	100
			Total	**30**	**20**			

SECOND SEMESTER

Part	Study Component	Course Code	Course Title	Hours	Credits	CIA Marks	ESE Marks	Total Marks
I	Tamil	P1LT21	Idaikkala Ilakkiyamum Nadaga Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS21	Poetry, Grammar & History of Sanskrit Literature – II					
II	English	P2LE21	English for Advanced Communication Skills	6	3	25	75	100
III	Core Course	05CT21	Integral Calculus	5	4	25	75	100
	Core Course	05CT22	Analytical Geometry 3D and Vector Calculus	5	4	25	75	100
	AEC	06AE02	AEC Physics - II	4	4	25	75	100
	AEC	06AP03	AEC Physics Practical	2	2	40	60	100
IV	GEC	05GE21	Statistics and Operations Research	2	2	25	75	100
			Total	**30**	**22**			

THIRD SEMESTER

Part	Study Component	Course Code	Course Title	Hours	Credits	CIA Marks	ESE Marks	Total Marks
I	Tamil	P1LT31	Kappiya Ilakkiyamum Urainadai Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS31	Prose, poetics and History of Sanskrit Literature –III					
II	English	P2LE31	English for Academic Excellence and Success	6	3	25	75	100
III	Core Course	05CT31	Differential Equations	5	4	25	75	100
	Core Course	05CT32	Numerical Methods	5	4	25	75	100
	AEC	05AE31	Programming in Python	4	3	25	75	100
	AEC	05AP32	Practical: Programming in Python	2	2	40	60	100
IV	SEC	05SE31	Competitive Mathematics	2	2	25	75	100
			Total	**30**	**21**			

FOURTH SEMESTER

Part	Study Component	Course Code	Course Title	Hours	Credits	CIA Marks	ESE Marks	Total Marks
I	Tamil	P1LT41	Sanga Ilakkiyamum Neethi Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS41	Drama and History of Sanskrit Literature – IV					
II	English	P2LE41	English for Career and Professional Developments	6	3	25	75	100
III	Core Course	05CT41	Sequence and Series	5	4	25	75	100
	Core Course	05CT42	Statistics	5	4	25	75	100
	AEC	05AE41	Programming in C++	4	3	25	75	100
	AEC	05AP42	Practical: Programming in C++	2	2	40	60	100
IV	SEC	05SE41	Practical: Latex	2	2	40	60	100
			Total	**30**	**21**			

FIFTH SEMESTER

Part	Study Component	Course Code	Course Title	Hours	Credits	CIA Marks	ESE Marks	Total Marks
III	Core Course	05CT51	Advanced Statistics	5	4	25	75	100
	Core Course	05CT52	Modern Algebra	5	4	25	75	100
	Core Course	05CT53	Real Analysis	5	5	25	75	100
	Core Course	05CT54	Mechanics	6	5	25	75	100
	DSE	05DS5A	Linear Programming	5	5	25	75	100
		05DS5B	Combinatorics					
IV	SEC	05SE51	Practical: Matlab	2	2	40	60	100
	ES	ESUG51	Environmental Studies	2	2	25	75	100
			Total	**30**	**27**			

SIXTH SEMESTER

Part	Study Component	Course Code	Course Title	Hours	Credits	CIA Marks	ESE Marks	Total Marks
III	Core Course	05CT61	Linear Algebra	5	5	25	75	100
	Core Course	05CT62	Complex Analysis	6	5	25	75	100
	DSE	05DS6A	Graph Theory	5	5	25	75	100
		05DS6B	Cryptography					
	DSE	05DS6C	Operations Research	6	5	25	75	100
		05DS6D	Fuzzy Sets					
IV	SEC	05SE61	Vedic Mathematics	2	2	25	75	100
	SEC	05SE62	Quantitative Aptitude	2	2	25	75	100
	SEC	05SE63	Practical: Statistical Package for the Social Sciences	2	2	40	60	100
	VE	VEUG61	Value Education	2	2	25	75	100
V	EA	EAUG61	Extension Activities		1	-	100	100
			Total	**30**	**29**			

Note:

AEC - Ability Enhancement Course.
GEC - Generic Elective Course.
SEC - Skill Enhancement Course.
DSE - Discipline Specific Elective.

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- I**
Course Title **: Algebra and Trigonometry**		
Course Code: **05CT11**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the I B.Sc. Mathematics students to provide a strong foundation on the concepts in Algebra and Trigonometry.

Course Learning Outcomes (CLOs)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basic concepts and get the knowledge about irrational and imaginary roots and transformations of equations.	K_1
CLO 2	understand the basic concepts of reciprocal equations	K_2
CLO 3	find the approximate roots using Horner's method	K_2, K_3
CLO 4	derive the expansions of sinθ, cosθ, tanθ, sin nθ, cos nθ, tan nθ, $\sin^n\theta$, $\cos^n\theta$.	K_2, K_3
CLO 5	understand the concept of the logarithm of complex numbers and to find the sum of trigonometric series using C+iS method summation of series.	K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	**Algebra** Irrational roots, imaginary roots- relation between roots and coefficients- symmetric functions of the roots- sum of the powers of roots – Newton's theorem(without proof) - transformations of equations – roots with signs changed – roots multiplied by a given number.	**(15Hrs)**
UNIT-II	Reciprocal equations – synthetic division - decreasing and increasing the roots- removal of terms – to form an equation whose roots are any power of the roots – transformations in general.	**(15Hrs)**
UNIT- III	Descarte's rule of signs – Rolle's theorem – multiple roots – finding approximate roots using Horner's method.	**(15Hrs)**

UNIT- IV	**Trigonometry** Expansions – expansions of cosnθ, sinnθ, tannθ -expansions for $\cos^n\theta$ and $\sin^n\theta$ – expansions of sinθ, cosθ, and tanθ in series of ascending powers of θ – hyperbolic functions-inverse hyperbolic functions.	**(15Hrs)**
UNIT- V	Logarithm of complex numbers – summation of series : (C+iS method only)	**(15Hrs)**

Text Books

1. Algebra Vol. 1 by T.K.Manicavachagampillai, T. Natarajan, K S Ganapathy, Viswanathan printers and publishers pvt. Ltd., Chennai – Edition 2004.
2. Trigonometry by T.K.Manicavachagampillai, Viswanathan printers and publishers pvt. Ltd., Chennai – Edition 2004.

Unit	Text Book	Chapters
1	1	6 (1-15(15.1-15.2))
2		6 (16-21)
3		6 (24-26, 30)
4	2	III(1-5)&IV(1, 2.0 – 2.3)
5		V(5.0 - 5.2) & VI(3.0 - 3.2)

Reference Books

1. Algebra by Dr. S. Arumugam, New gamma publishing house, Palayankottai.
2. Trigonometry by Dr. S. Arumugam & Thangapandi Issac New Gamma publishing house, Palayankottai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT11

05CT11	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	-	3	-	3
CLO2	9	-	3	-	3	-	3
CLO3	9	-	3	-	3	-	3
CLO4	9	-	3	-	3	-	3
CLO5	9	-	3	-	3	-	3
Weightage of the course	45	-	15	-	15	-	15
Weighted percentage of Course contribution to PLOs	3	0	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT11

05CT11	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	5	5	3	5

Online Resources

Solution of algebraic equation:
https://youtu.be/Z-ZkmpQBIFo
https://youtu.be/hXXdCRsNYOU
https://youtu.be/VTQSGYnqw1Y
Reciprocal Equations:
https://youtu.be/0HwGGTdrBzg
https://youtu.be/dppJ_iHcZsQ
Horner's method:
https://youtu.be/Eds30oX3d9k
Expansion of Trigonometry Ratio:
https://youtu.be/6Rw-GMEjQ8s
https://youtu.be/giAjpfwC2LE
https://youtu.be/2VMiwNcg0ek
Inverse Trigonometry Ratio:
https://youtu.be/YXWKpgmLgHk
https://youtu.be/w9sjzaXEGVw
https://youtu.be/ADpxUQMCSng

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- I**
Course Title **: DIFFERENTIAL CALCULUS**		
Course Code: **05CT12**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to

- Have a thorough knowledge of differentiation.
- Solve the problems using expansion of functions
- Know about curvature, radius of curvature and evolute.
- Gain knowledge about the application of Differential Calculus at higher level.
- Acquire the basic skill to solve problems on differential calculus and concept of differential equation.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basic concepts and definitions of differentiation and explain the method of differentiation	K_1, K_2
CLO 2	get knowledge of successive differentiation and Leibnitz theorem.	K_2, K_3
CLO 3	understand the concept of subtangent and subnormal which are important in physics and also the concept of envelope, a curve that is tangential to each one of a family of curves in a plane.	K_2, K_3
CLO 4	get the knowledge of radius of curvature ,which shows how a curve is almost part of a circle in a local region	K_2
CLO 5	understand the concept of partial derivatives which are used in vector calculus and differential geometry.	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	**Differentiation** Methods of differentiation: standard forms – differential coefficients of x^n, e^x, logx, sinx, cosx, tanx, (derivations not included). Differential coefficient of a sum or difference – product rule – quotient rule – function of a function rule – inverse functions – hyperbolic functions, inverse hyperbolic functions – logarithmic differentiation – trigonometrical transformations– differentiation of implicit function- differentiation of one function w.r.t. another function.	**(15 Hrs)**

UNIT-II	**Successive Differentiation** Successive differentiation –the n^{th} derivative – standard results – formation of equation involving derivatives –Leibnitz formula for the n^{th} derivative of a product and related problems	**(16 Hrs)**
UNIT- III	**Subtangent, Subnormal & Envelope** Subtangent and subnormal – differential coefficient of the length of an arc of a curve – polar coordinates – angle between the radius vector and the tangent – angle of intersection of two curves – length of an arc in polar co-ordinates – envelope - method of finding the envelopes	**(16 Hrs)**
UNIT- IV	**Curvature of plane curves** Curvature –radius, centre, circle and chord of curvature – Cartesian formula for the radius of curvature – the coordinates of centre of curvature-evolute and involute – radius of curvature when the curve is given in polar co-ordinates – pedal equation of a curve.	**(16 Hrs)**
UNIT- V	**Partial differentiation** Partial differentiation –function of a function rule- total differential coefficient- implicit functions –homogeneous functions	**(12 Hrs)**

Text Book

CALCULUS vol I by T.K.Manikavasakam Pillai & S.NarayananVishwanathan printers and publishers Pvt Ltd. Chennai – Reprint 2017.

Units	Chapters
1	chapter-2
2	chapter-3
3	chapter-9 (except 1 section) & 10 (1.1 – 1.4)
4	chapter-10 (2.1 – 2.7)
5	chapter-8 (1.1 – 1.3, 1.5 – 1.6)

Reference Book

CALCULUS by Dr. S. Arumugam, New Gamma publishing house, Palayamkottai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT12

05CT12	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	9	3	3	3	3
CLO2	9	-	9	3	3	3	3
CLO3	9	-	9	3	3	3	3
CLO4	9	-	9	3	3	3	3
CLO5	9	-	9	3	3	3	3
Weightage of the course	45	-	45	15	15	15	15
Weighted percentage of Course contribution to PLOs	3	0	5	2	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT12

05CT12	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	3	9	9	3
CLO2	9	9	3	3	3
CLO3	3	9	3	9	9
CLO4	3	9	3	9	9
CLO5	9	3	9	9	3
Weightage of the course	33	33	27	39	27
Weighted percentage of Course contribution to PSOs	4	3	3	7	3

Online Resources

1. Differentiation standard forms - https://www.youtube.com/watch?v=BcOPKQAZcn0
2. Successive differentiation - https://www.youtube.com/watch?v=ftGzd9dguzs
3. Subtangent & subnormal - https://www.youtube.com/watch?v=QiXRNcDWDw8
4. Curvature - https://www.youtube.com/watch?v=gspjhwSNMWs
5. PDE - https://www.youtube.com/watch?v=O3ahEHAX-KU

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER - **I**
Course Title **: AEC PHYSICS – I**		
Course Code: **06AE01**	Hours per week: 4	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to

- It deals with the concept of principles of wave motion
- Gives an idea about Elasticity, viscosity and surface tension
- It discusses the study of thermal physics
- Apply the concept of electricity
- Providing good foundation in optics

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	explain the basic concepts of acoustic studies	K_2
CLO 2	understand the properties of matter like elasticity, viscosity and surface tension	K_2
CLO 3	outline theory of laws of thermodynamics	K_2, K_3
CLO 4	understand the basic concept of electricity and magnetism	K_2
CLO 5	apply the methodology of optical activities.	K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	**Waves and Oscillations** Simple Harmonic Motion – Composition of two Simple Harmonic Motions in a straight line- Composition of two Simple Harmonic Motions of equal time periods at right angles- - Melde's Experiment – Ultrasonics- production –application and uses- – Reverberation – Absorption coefficient - Acoustics of buildings – factors affecting the acoustics of buildings- Sound distribution in an auditorium	**(12 Hrs)**
UNIT-II	**Properties of Matter** **Elasticity:** Introduction- Different moduli of elasticity – Poisson's ratio-Energy stored in a stretched wire - Bending of beams – expression for the bending moment- Theory of Non-uniform bending – Torsion Pendulum – expression for the period of oscillation of a torsion pendulum. **Viscosity:** Streamline flow and turbulent flow – Coefficient of	**(12 Hrs)**

	viscosity - Derivation of Poiseulle's formula. **Surface Tension:** Introduction- experimental determination of surface tension – Jaegar's method.	
UNIT- III	**Thermal Physics** Laws of thermodynamics – Zeroth law of thermodynamics – first law of thermodynamics - second law of thermodynamics- third law of thermodynamics – Heat engine – Entropy – Change of entropy in a carnots cycle.	**(12 Hrs)**
UNIT- IV	**Electricity and Magnetism** Introduction – Magnetic effect of electric current – Oersted's experiment –BiotSavart law- Magnetic induction at a point on the axis of a circular coil- choke coil-Electric circuit – switches- fuses- circuit breaker – the relay	**(12 Hrs)**
UNIT- V	**Geometrical Optics** Introduction – image formation by refraction – Critical angle –Refraction through prism – direct vision spectroscope – coma – Spherical aberration in a lens – methods of minimizing spherical aberration – condition for minimum spherical aberration of two thin lenses separated by a distance - chromatic aberration in a lens- condition for achromatism of two lenses separated by a distance	**(12 Hrs)**

Text Book

1. Allied Physics Paper I and II - R. Murugeshan, M.Shantha Kiruthiga Sivaprasath, S.Chand & Company Pvt. Ltd. New Delhi, Revised Edition, Reprint 2014.

Reference Books

1. Electricity and Magnetism - R. Murugeshan -Reprint with correction 2008
2. Principles of Electronics - V.K.Metha & Rohit Metha -Multicolour Illustrative edition – 2006- S. Chand & Company Ltd., New Delhi
3. Modern Physics-R. Murugeshan & Kiruthiga Sivaprasath- Multicolour Edition – 2007- S. Chand & Company Ltd., New Delhi

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 06AE01

06AE01	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	-	3	-	3
CLO2	9	-	3	-	3	-	3
CLO3	9	-	3	-	3	-	3
CLO4	9	-	3	-	3	-	3
CLO5	9	-	3	-	3	-	3
Weightage of the course	45	-	15	-	15	-	15
Weighted percentage of Course contribution to PLOs	3	0	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 06AE01

06AE01	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	4	4	3	5

Online Resources

Unit – 1:
Unit – 2:
Unit – 3:
Unit – 4:
Unit – 5:

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Generic Elective Course**		SEMESTER **- I**
Course Title **: Fundamentals of Mathematics**		
Course Code: **05GE11**	Hours per week: 2	Credits: 2
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to

- Have a thorough knowledge of Ratio & Proportion.
- Solve the problems in equation of lines.
- Know about matrices, addition & Multiplication in matrices.
- Gain knowledge about arithmetic series & Geometric series.
- Solve the problems in quadratic equations.

Syllabus

Unit-I

Theory of indices – Ratio and Proportion.

Unit-II

Distance between two points – Equation of a line – Different forms [except normal form].

Unit-III

Theory of Matrices – Addition, multiplication of two matrices.

Unit-IV

Finding the n^{th} term and sum to n terms of an A.P and G.P – Arithmetic mean and geometric mean.

Unit-V

Solving the quadratic equations – finding the roots – forming the equation when the roots are given (only second degree).

Text Books

1. Business Mathematics by Dr.V.R.Vittal, Margham publications, Chennai (Reprint 2012).
2. A text Book of Business Mathematics by Padmalochan Hazarika, S. Chand publication (Reprint 2014).

Unit	Text Books	Chapters
1	1	Chapter 4,2
2		Chapter 12
3		Chapter 14
4		Chapter 7
5	2	Chapter 3 (3.2)

Reference Book

Business mathematics by Dr.M.Manoharan & Dr.C.Elango Palani Paramount publications, Palani.2006 Edt.

Online Resources

1. Theory of indices - https://www.youtube.com/watch?v=BUJKEDqGp1U
2. Distance between two points - https://www.youtube.com/watch?v=0IOEPcAHgi4
3. Matrices - https://www.youtube.com/watch?v=xyAuNHPsq-g
4. AP & GP - https://www.youtube.com/watch?v=gua96ju_FBk
5. Quadratic equations - https://www.youtube.com/watch?v=UZTvYYoOrmI

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- II**
Course Title **: Integral Calculus**		
Course Code: **05CT21**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the I B.Sc. Mathematics students to provide a strong foundation on the concepts in Integral Calculus and to develop the skill of solving problems.

Course Learning Outcomes (CLO)

Upon successful completion of this course, the students will able to

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	recall the integration of algebraic, rational, trigonometrical, exponential and logarithmic functions	K_1
CLO 2	recognize the integration as the reverse process of differentiation	K_2
CLO 3	compute the definite and indefinite integrals by using the techniques of integration	K_2, K_3
CLO 4	use the knowledge of multiple integrals for finding the volume and area	K_2,K_3
CLO 5	use the integration to solve real world problems.	K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Integration – Introduction – standard forms – methods of integration – integral of function containing linear function of x – integrals of the form $\int F[(f(x)]f'(x)dx$-integration of rational & irrational algebraic functions.	**(15Hrs)**
UNIT-II	Properties of definite integrals – integration by parts – reduction formulae for integrands $x^n e^{ax}$, $x^n \cos ax$, $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$, $\tan^n x$, $\cot^n x$, $\sec^n x$, $\operatorname{cosec}^n x$.	**(15Hrs)**
UNIT- III	Double integral – evaluation of double integral – double integral in polar coordinates – Beta and Gamma functions.	**(15Hrs)**
UNIT- IV	Triple integrals – change of variables – Jacobean – transformation from Cartesian to polar coordinates – Cartesian to spherical polar coordinates – Cartesian to cylindrical coordinates – area by double integral – volume by triple integral.	**(15Hrs)**
UNIT- V	Fourier series – definition – even and odd functions – expanding f(x) as Fourier series in $(-\pi,\pi)$, $(0,2\pi)$ – half range series – development of cosine and sine series – change of interval – expanding f(x) as Fourier series in (-l,l), (0,2l) and (0,l)	**(15Hrs)**

Text Book

Calculus Vol II and III by S. Narayanan, T.K. Manicavachagompillay. S.Visvanthan, Printers & publishers, Pvt. Ltd., Chennai – Reprint 2019.

Unit	Volume Number	Chapters
1	II	Chapter 1 (1.1, 1.2, 2, 3, 5, 6.1, 6.2, 6.6, 7.1, 7.3, 7.4, 7.5 & 8)
2		Chapter 1 (4, 11, 12, 13.1 – 13.9)
3		Chapter 5 (2.1, 2.2, 3.1, 3.2) & 7
4		Chapter 5 (4), 6 (1.1, 2.3, 2.4)
5	III	Chapter 6 (1, 2, 3, 4, 5.1, 5.2, 6)

Reference Book

Calculus by Dr.S.Arumugam, New Gamma Publishing House, Palayamkottai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT21

05CT21	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	-	3	-	3
CLO2	9	-	3	-	3	-	3
CLO3	9	-	3	-	3	-	3
CLO4	9	-	3	-	3	-	3
CLO5	9	-	3	-	3	-	3
Weightage of the course	45	-	15	-	15	-	15
Weighted percentage of Course contribution to PLOs	3	0	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT21

05CT21	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	9	9	9	3	3
CLO3	9	9	9	3	9
CLO4	9	9	9	3	9
CLO5	9	9	9	3	9
Weightage of the course	45	45	45	15	36
Weighted percentage of Course contribution to PSOs	6	4	4	3	4

Online Resources

1. Integration – Definite integral - https://www.youtube.com/watch?v=rCWOdfQ3cwQ
2. Properties of Definite integral - https://www.youtube.com/watch?v=rCWOdfQ3cwQ
3. Double integral – htt ps://www.youtube.com/watch?v=db7d_a0wiUg
4. Triple integrals - https://www.youtube.com/watch?v=7iy83x8bv6o
5. Fourier series - https://www.youtube.com/watch?v=x04dnqg-iPw

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- II**
Course Title **: ANALYTICAL GEOMETRY 3D AND VECTOR CALCULUS**		
Course Code: **05CT22**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to acquire the basic knowledge in the three dimensional Analytical Geometry and Vector Calculus.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basic concepts of coordinate system and planes. Equation of a straight line. Equation of a sphere. Basic concepts of vector differentiation and vector integration	K_1, K_2
CLO 2	know about the relation between the direction ratios and direction cosines of a line, different forms of the equation of a plane, equation of a straight line and equation of a sphere.	K_2, K_3
CLO 3	find the angle between two planes, angle between a line and a plane, shortest distance between two lines and circle of intersection of two spheres.	K_2, K_3
CLO 4	know about divergence and curl of a vector, solenoidal and irrotational vectors, Laplacian operator.	K_2
CLO 5	get the knowledge of Green's theorem, Stoke's theorem and Gauss divergence theorem and application these theorems.	K_2, K_3

K1-Remebering **K_2-Understand** **K_3-Apply**

Syllabus

UNIT-I	**Coordinate System and Planes** Coordinate system and planes - rectangular Cartesian coordinates - direction cosines – direction ratios – angle between 2 lines-condition for parallelism and perpendicularity- planes – equation of a plane - different forms – general form, three point form, intercept form, normal form-angle between two planes – length of the perpendicular from a point to a plane-angle bisectors of two planes.	**(17 Hrs)**
UNIT-II	**The Straight Line** Straight line - equation of a straight line-different forms – non-symmetric form, symmetric form, two point form – a plane and a line-coplanar lines-condition for coplanarity- angle between a line and a plane - equation of a plane containing two lines – length of the perpendicular from a point to a	**(17 Hrs)**

	line - skew lines – shortest distance between two skew lines.	
UNIT- III	**Sphere** The Sphere - equation of a sphere – different forms – centre radius form, diameter form- tangent line and tangent plane – angle of intersection of two spheres-section of a sphere.	**(12 Hrs)**
UNIT- IV	**Vector Differentiation** Vector differentiation – differentiation of vectors – gradient of vectors – geometrical interpretation – directional derivative and its maximum value – divergence and curl of a vector – solenoidal and irrotational vectors – Laplacian operator – harmonic vectors – connected theorems and problems.	**(14 Hrs)**
UNIT- V	**Line and Surface integrals** Vector integration – line integrals – work done by a force – surface integrals – integral theorems – Green's theorem in plane , Stoke's theorem, Gauss divergence theorem (statement of theorems only) – simple problems.	**(15 Hrs)**

Text Books

1. Analytical Geometry 3 Dimensions by T.K. Manicavachagom pillai, S. Vishwanathan (Reprint 2017) printers and publishers Pvt. Ltd. Chennai
2. Vector Calculus by S.Narayanan &T.K. Manicavachagom pillai (1997 edition) printers and publishers Pvt. Ltd. Chennai

Unit	Text Books	Chapters
1	1	Chapter 1 and 2
2		Chapter 3 (Section: 1 – 8)
3		Chapter 4
4	2	Chapter 1 (Section 1 – 11)
5		Chapter 3 (Section 1 – 10)

Reference Book

1. Analytical Geometry 3 Dimensions and Vector Calculus by S. Arumugam and Thangapandian Issac. New Gamma publishing company, Palayamkottai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT22

05CT22	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	-	3	-	3
CLO2	9	-	3	-	3	-	3
CLO3	9	-	3	-	3	-	3
CLO4	9	-	3	-	3	-	3
CLO5	9	-	3	-	3	-	3
Weightage of the course	45	-	15	-	15	-	15
Weighted percentage of Course contribution to PLOs	3	0	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT22

05CT22	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	9	9	9	3	3
CLO3	9	9	9	3	9
CLO4	9	9	9	3	9
CLO5	9	9	9	3	9
Weightage of the course	45	45	45	15	36
Weighted percentage of Course contribution to PSOs	6	4	4	3	4

Online Resources

https://youtu.be/Ee75OMJbz8Q
https://youtu.be/6DFy9dGDj9A
https://youtu.be/plCve8lLNbg (Plane)
https://youtu.be/VYRJOS4F4w4
https://youtu.be/YWiapEzQ56g (Straight line)
https://youtu.be/a2mt2L0e06Y
https://youtu.be/mbJsTFX33H4 (Sphere)
https://youtu.be/TCZ1GMoaUJw
https://youtu.be/csCskd01jwE (Vector Differentiation)
https://youtu.be/gQCIK0hlI2M (Line Integral)
https://youtu.be/Gml1HT4y3_c (Surface Integral)
https://youtu.be/_GRF5WaPBFU (Volume Integral)
https://youtu.be/tjXX5wxPqUI (Green's, Gauss and Stokes Theorem)

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER **- II**
Course Title **: AEC PHYSICS – II**		
Course Code: **06AE02**	Hours per week: 4	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to

- learn the basic concepts of Physical Optics
- understand the fundamental concepts of Atomic Physics
- learn the basics of Nuclear Physics and its applications
- learn the principles of relativity
- understand fundamentals of analogue and digital electronics

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	differentiate various wave phenomenon of light such as interference, diffraction and polarization	K_1, K_2
CLO 2	understand the concept of spin and implication in classification of elements	K_2
CLO 3	distinguish between Nuclear Fission and Fusion and their applications	K_1,K_2, K_3
CLO 4	understand the significance of Lorentz transformation and Mass energy equivalence	K_2
CLO 5	distinguish between Junction Diode and Zener Diode and explain various logic gates	K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	**PHYSICAL OPTICS** Interference – Introduction – interference in thin films – production of colors in thin films – diffraction – introduction – plane transmission diffraction grating – polarization – introduction – double refraction – specific rotator power - lauret's half shade polarimeter – difference between interference and diffraction.	**(12 Hrs)**
UNIT-II	**ATOMIC PHYSICS** Vector atom model – Quantum numbers associated with the vector atom model – the Pauli's exclusion principle – magnetic dipole moment due to spin – the stern and gerlach experiment.	**(12 Hrs)**

UNIT- III	**NUCLEAR PHYSICS** Models of nuclear structure – mass defect – binding energy – ionization chamber - nuclear fission-energy released in fission- atom bomb – Nuclear reactor – Nuclear fusion – Distinction between fission and fusion.	**(12 Hrs)**
UNIT- IV	**ELEMENTS OF RELATIVITY** Frame of reference - Galilean Transformation Equations – Postulates of Special theory of Relativity – The Lorentz Transformation Equations - derivation – Length Contraction – Time Dilation –Mass Energy Equivalence	**(12 Hrs)**
UNIT- V	**ELECTRONICS** Light Emitting Diode (LED) – Zener Diode- experiment to study the characteristics of the zener diode – zener diode as voltage regulator – Logic Gates – AND gate – OR gate- the NOT gate – the NAND gate –NAND gate is a universal gate- the NOR gate –NOR gate is universal gate – Boolean algebra – Postulates and theorem of Boolean algebra - De Morgan's theorem.	**(12 Hrs)**

Text Book

Allied Physics Paper I and II - R. Murugeshan, M.Shantha Kiruthiga Sivaprasath, S.Chand & Company Pvt. Ltd. New Delhi, Revised Edition, Reprint 2014.

Unit I: 6.2 to 6.4, 6.8, 6.10, 6.12, 6.14, 6.19, 6.20
Unit II: 7.1, 7.2, 7.4, 7.7, 7.8
Unit III: 8.1, 8.3, 8.4, 8.6, 8.8, 8.9, 8.12, 8.13, 8.14
Unit IV: 10.1 to 10.4, 10.11 to 10.21
Unit V: 9.1 to 9.7, 9.9

Reference Books

1. Electricity and Magnetism - R. Murugeshan -Reprint with correction 2008
2. Principles of Electronics - V.K.Metha & Rohit Metha -Multicolour Illustrative edition – 2006- S. Chand & Company Ltd., New Delhi
3. Modern Physics-R. Murugeshan & Kiruthiga Sivaprasath- Multicolour Edition – 2007- S. Chand & Company Ltd., New Delhi

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 06AE02

06AE02	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	-	3	-	3
CLO2	9	-	3	-	3	-	3
CLO3	9	-	3	-	3	-	3
CLO4	9	-	3	-	3	-	3
CLO5	9	-	3	-	3	-	3
Weightage of the course	45	-	15	-	15	-	15
Weighted percentage of Course contribution to PLOs	3	0	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 06AE02

06AE02	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	9	9	9	3	3
CLO3	9	9	9	3	9
CLO4	9	9	9	3	9
CLO5	9	9	9	3	9
Weightage of the course	45	45	45	15	36
Weighted percentage of Course contribution to PSOs	6	4	4	3	4

Online Resources

Unit – 1:
Unit – 2:
Unit – 3:
Unit – 4:
Unit – 5:

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER **- II**
Course Title **: AEC PHYSICS PRACTICAL**		
Course Code: **06AP03**	Hours per week: 2	Credits: 2
CIA : 40 Marks	ESE : 60 Marks	Total : 100 Marks

Preamble

To enable the students to

- Develop practical skills in mechanical, electrical measurements and optics experiments.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	estimate the value of Young's modulus of a given iron bar, wooden scale and the value of Rigidity modulus of a given wire	K3
CLO 2	estimate the viscosity of a given liquid	K3
CLO 3	measure the thickness of thin paper and radius of curvature of a convex lens	K3
CLO 4	determine the refractive index a glass prism and wave length of the prominent lines of the mercury spectrum	K3
CLO 5	draw I-V characteristics of a diode and Zener diode	K3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

1	Non-Uniform Bending – Pin and Microscope
2	Uniform Bending – Pin and Microscope
3	Non-Uniform Bending – Optic lever
4	Uniform Bending – Optic lever
5	Compound Pendulum
6	Torsional Pendulum
7	Sonometer – Verification of Laws (1^{st} law & 2^{nd} law)
8	Viscosity by Stoke's method
9	Newton's rings – Determination of Radius of curvature
10	Air wedge – Thickness of a wire
11	Spectrometer – Refractive Index
12	Spectrometer – Grating -Normal incidence
13	Carey Foster Bridge
14	Diode Characteristics & Zener Diode Characteristics
15	Logic Gates – AND, OR, NOT

Text Books

1. Allied Physics Paper I and II - R. Murugeshan, M.Shantha Kiruthiga Sivaprasath, S.Chand & Company Pvt. Ltd. New Delhi, Revised Edition, Reprint 2014.
2. Mechanics Properties of Matter Practical I- R. Murugeshan, 2002.

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Generic Elective Course**		SEMESTER **- II**
Course Title **: Statistics and Operations Research**		
Course Code: **05GE21**	Hours per week: 2	Credits: 2
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to develop the skill in solving problems of Averages, QD & SD, LPP, Transportation & Assignment problems.

Syllabus

Unit-I: Averages: Mean, median, mode.

Unit-II: Deviation: Quartile deviation – Standard deviation.

Unit-III: Graphical solution of L.P.P.

Unit-IV: Transportation problem.

Unit-V: Assignment problem.

TEXT BOOKS

1. Statistics by Dr.S.Arumugam, New Gamma publications Palayamkottai.Edition 2013.
2. Operations Research by Dr.S.Arumugam. Scitech Publications, Chennai, Edition 2006.

Unit	Chapters
1	Chapter 2 (Section: 2.1-2.3)
2	Chapter 3
3	Chapter 3 (Section: 3.1-3.3)
4	Chapter 10 (Section: 10.1-10.2, 10.9, 10.13.)
5	Chapter 11 (Section: 11.1-11.4)

REFERENCE BOOKS

1. Statisticsby S.C.Guptha & V.K.Kapur Sultan, Chand & sons New Delhi.
2. Operations Research by Kanti Swarop P.K.Guptha and Manmohan 5th edition 2005.

Online Resources

Unit I - Mean, Median, Mode: https://youtu.be/uszshEZmSd8 , https://youtu.be/40hHbm8jlFE , https://youtu.be/a1YNCRXb1Oc ,
Unit II : Deviation: https://youtu.be/Aydqi-mPdf4 , https://youtu.be/mYE0e8JpgHs , https://youtu.be/MRqtXL2WX2M , https://youtu.be/wpY9o_OyxoQ ,
Unit III Graphical Method : https://youtu.be/O6QO3J_85as , https://www.slideshare.net/kratikadhoot/graphical-method-17041901 ,
Unit IV Transportation Problem: https://youtu.be/ItOuvM2KmD4, https://www.slideshare.net/VishalHotchandani2/transportation-problems-183454172 ,
Unit V Assignment Problem: https://youtu.be/rrfFTdO2Z7I , https://www.slideshare.net/NakulBhardwaj1/assignment-problem-52928205 , https://www.slideshare.net/abubashars/assignment-problem-18034506

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER - **III**
Course Title **: Differential Equations**		
Course Code: **05CT31**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the II B.Sc. Mathematics students to provide a strong foundation on the concepts in Differential Equations.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basic concepts and get the knowledge about the differential equations of first order. Also study the different types of methods to solve the differential equations of first order.	K1
CLO 2	derive the solutions of the differential equations of higher order with constant coefficients and with variable coefficients.	K_2
CLO 3	study the different types of methods to solve the linear differential equations.	K_2, K_3
CLO 4	understand the concept of the Laplace transformations, inverse Laplace transformations. Also to solve the differential equations using Laplace transformations.	K_2,K_3
CLO 5	understand the basic concepts and get the knowledge about the partial differential equations. Also study the different types of methods to solve the partial differential equations.	K_1,K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Differential equations of first order – formation of differential equations – homogeneous equations – non homogeneous equations – linear equations – Bernoulli's equations – exact equations.	**(15 Hrs)**
UNIT-II	Linear differential equations with constant coefficients – particular integrals of functions of the form e^{ax}, cos ax, sin ax, x^m, $e^{ax}V$ – equations with variable coefficients-equations reducible to the linear homogenous equations.	**(15 Hrs)**

UNIT- III	Variation of parameters – simultaneous differential equations – simultaneous equations with constant coefficients – total differential equations.	**(15 Hrs)**
UNIT- IV	Laplace transformations – the inverse Laplace transformations – solving differential equations using Laplace transformations.	**(15 Hrs)**
UNIT- V	Partial differential equations – derivation of partial differential equations – different integrals of partial differential equations – solutions of partial differential equations in some simple cases – standard types of partial differential equations – standard I, II, III, IV – Lagrange's equations.	**(15 Hrs)**

Text Book

Calculus – vol III, by S. Narayanan, T.K.Manicavachagam Pillay, S.Viswanathan (printers & publishers) Pvt. Ltd (Reprint 2017).

Unit	Chapters
1	Chapter 1 (Section: 1-3)
2	Chapter 2 (Section: 1-4 & 8 - 9)
3	Chapter 2 (Section: 10) and 3
4	Chapter 5
5	Chapter 4 (Section: 1-6)

Reference Book

Differential equations, by Dr.S.Arumugam, New Gamma Publishing House, Palayamkottai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT31

05CT31	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	9	3	3	3
CLO2	9	-	3	3	3	3	3
CLO3	3	-	3	3	3	3	3
CLO4	9	-	3	9	3	3	3
CLO5	9	-	3	3	3	3	3
Weightage of the course	39	-	15	27	15	15	15
Weighted percentage of Course contribution to PLOs	2	0	2	3	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT31

05CT31	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	3	9	3	3
CLO2	3	3	3	9	9

CLO3	3	3	3	3	3
CLO4	9	3	9	3	3
CLO5	9	3	3	9	9
Weightage of the course	33	15	27	27	27
Weighted percentage of Course contribution to PSOs	4	1	3	5	3

Online Resources

https://www.youtube.com/watch?v=gd1FYn86P0c (First order differential Equation)
https://www.youtube.com/watch?v=ot4Bfd4VBvo (Linear Differential Equation with Constant Coefficients)
https://www.youtube.com/watch?v=n_3ZmnVnrc4 (simultaneous differential equations)
https://www.youtube.com/watch?v=47aTGnEfLfQ (total differential equations)
https://www.youtube.be/8oE1shAX96U (Laplace Transform)
https://youtu.be/luJMl37-nso
https://youtu.be/EDVJotmT584(Laplace Transform)
https://youtu.be/_P519nGupO8
https://youtu.be/HuHgbEuUBSo(Inverse Laplace Transform)
https://youtu.be/u4yBWpmB6z4
https://youtu.be/OCLw11a0LTM(Partial Differential Equation)
https://youtu.be/ongICvz1BsQ
https://youtu.be/vSdrKPNIIRE(Types of Partial Differential Equation)
https://youtu.be/41U-i1Q7se0
https://youtu.be/QLLOI382tZw(Lagrange's form)

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER - **III**
Course Title **: Numerical Methods**		
Course Code: **05CT32**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the II B.Sc. Mathematics students to provide a strong foundation on the concepts in Numerical Methods.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basic concepts Algebraic and transcendental equations and solve the equations using different types of methods.	K1
CLO 2	understand the concept of finite differences and interpolation and understand the different types of interpolation formulae.	K_2
CLO 3	understand the concept of Numerical differentiation and apply it in different types of formulae.	K_2, K_3
CLO 4	understand the concept of Numerical Integration and apply it in formula like Newton's cote's formula, trapezoidal rule and Simpson's rules	K_2,K_3
CLO 5	study the basic concept of Numerical solution of differential equations, to solve the differential equation by different types of numerical methods.	K_1,K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	**Solution of equations:** Solution of algebraic and transcendental equations - Bisection method – Method of false position (Regula-Falsi Method) - Newton-Raphson Iterative method - Solution of linear simultaneous equations - Direct methods of solution: Gauss elimination method , Gauss –Jordan method – Iterative methods of solution : Jacobi's method , Gauss – Seidel method.	**(15 Hrs)**
UNIT-II	**Finite differences:** Introduction – First differences – Higher Differences – Difference Tables- Backward Differences- Central Difference Notation – Properties of the operator Δ- Differences of a polynomial – Factorial Polynomials – Simple Problems – Error Propagation in a difference table – Operators E, ∇, δ, μ – Basic Properties.	**(15 Hrs)**

UNIT- III	**Interpolation:** Introduction- Linear Interpolation- Gregory Newton's forward interpolation formula –Newton's backward interpolation formula – equidistant terms with one or more missing values – error in polynomial interpolation- error in Newton's interpolation formulae **Central difference interpolation formulae:** Central difference tables- Central difference interpolation formulae- Gauss's Forward and Backward Interpolation Formulae – Stirling's Formula- Bessel's Formula – Laplace – Everett Formula- Simple Problems.	**(15 Hrs)**
UNIT- IV	**Interpolation with Unequal Intervals:** Divided difference – properties of divided differences – Newton's Interpolation formula for unequal intervals- Lagrange's interpolation formula- Inverse Interpolation – simple problems.	**(15 Hrs)**
UNIT- V	**Numerical differentiation:** Introduction - Newton's Forward and Backward difference formula to compute the derivatives upto second order – Derivatives using Strilings formula Maxima and Minima of a tabulated function. **Numerical integration:** The Trapezoidal rule -Simpson's one-third rule - Simpson's three eighth rule – Truncation error in Simpson's formula.	**(15 Hrs)**

Text Book

M.K. Venkataraman (1992) Numerical methods for Science and Engineering National Publishing Company, Chennai.

Reference Books

1. Numerical Analysis, by Dr.S.Arumugam, Prof. A.Thangapandi Issac andDr. A. Somasundaram, New Gamma Publishing House, Palayamkottai (Reprint 2013).
2. Numerical Methods, by A.Singaravelu, Meenakshi Agency – Chennai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT32

05CT32	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	9	3	3	9
CLO2	9	-	3	9	3	3	9
CLO3	9	-	3	9	3	3	9
CLO4	9	-	3	9	3	3	9
CLO5	9	-	3	9	3	3	9
Weightage of the course	45	-	15	45	15	15	45
Weighted percentage of Course contribution to PLOs	3	0	2	5	2	4	4

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT32

05CT32	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	9	9	9	3	3
CLO3	9	9	9	3	3
CLO4	9	9	9	3	3
CLO5	9	9	9	3	3
Weightage of the course	45	45	45	15	15
Weighted percentage of Course contribution to PSOs	6	4	4	3	2

Online Resources

Unit : I https://youtu.be/3j0c_FhOt5U,
https://youtu.be/3j0c_FhOt5U,
https://youtu.be/3j0c_FhOt5U
https://youtu.be/oPkTasoJngA,
https://youtu.be/jPv5pP1kOco,
https://youtu.be/7eHuQXMCOvA,
https://youtu.be/gxy6VI1hEfs
Unit : II https://youtu.be/6x_5R9zgglw,
https://youtu.be/i4xVS7bHv2Q,
https://youtu.be/_xAUGIhEimA
https://youtu.be/oOgtmTlj_t4,
https://youtu.be/6fFg8t64dD0
Unit : III https://youtu.be/hQvmLnyZDuE,
https://youtu.be/qhUIx096afA
https://youtu.be/UF668_B0epc,
https://youtu.be/GsSCE_6mfWk
Unit : IV https://youtu.be/quoNfERQo7s,
https://youtu.be/Sc5sAZeDdX4,
https://youtu.be/iuvXoUlmgFg
Unit : V https://youtu.be/yjPwvT4HFI8,
https://youtu.be/yjPwvT4HFI8,
https://youtu.be/rl8EiJ07i2I,
https://youtu.be/vu6Zyai9F_4,
https://youtu.be/IerLCCT08QU,
https://youtu.be/F1eU42dz1SU,
https://youtu.be/-3O6q7dWbqA

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER - **III**
Course Title **: Programming in Python**		
Course Code: **05AE31**	Hours per week: 4	Credits: 3
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the II B.Sc Mathematics students to provide the strong foundation on concepts Programming in Python

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	Understand the basic concepts of Python programming languages, debugging, Values and type of statements.	K_1, K_2
CLO 2	Gain the basic knowledge of functions and Fruitful functions in Python.	K_1, K_2
CLO 3	Learn the fundamental concepts of Iterations, Tables, Encapsulation and generalization.	K_2, K_3
CLO 4	Get basic knowledge of Strings and Lists.	K_2, K_3
CLO 5	Understand the elementary concepts of Tuples and Trees.	K_1, K_2

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	**Introduction of Python Programming:** The Python programming language - What is a program? What is debugging?- Formal and natural languages - The first program **Variable, Expression and statements:** Values and types – Variables- Variable names and keywords - Statements - Evaluating expressions - Operators and operands - Order of operations - Operations on strings - Composition - Comments	**(9 Hrs)**
UNIT-II	**Functions:** Function calls - Type conversion - Type coercion - Math functions - Composition - Adding new functions - Definitions and use -Flow of execution - Parameters and arguments - Variables and parameters are local - Stack diagrams - Functions with results . **Fruitful functions** : Return values - Program development - Composition - Boolean functions - More recursion - Leap of faith - One more example - Checking types	**(9 Hrs)**

UNIT- III	**Iteration**: Multiple assignment - The while statement - Tables - Two-dimensional tables - Encapsulation and generalization - More encapsulation - Local variables - More generalization - Functions.	**(9 Hrs)**
UNIT- IV:	**Strings :** A compound data type - Length - Traversal and the for loop - String slices - String comparison - Strings are immutable - A find function - Looping and counting - The string module - Character classification. **Lists** : List values -Accessing elements - List length - List membership - Lists and for loops - List operations - List slices - Lists are mutable - List deletion - Objects and values - Nested lists -Matrices - Strings and lists	**(9 Hrs)**
UNIT- V:	**Tuples:** Mutability and tuples - Tuple assignment - Tuples as return values - Random numbers - List of random numbers - Counting - Many buckets - A single-pass solution **Trees** : Building trees - Traversing trees - Expression trees - Tree traversal - Building an expression tree - Handling errors - The animal tree	**(9 Hrs)**

Text Book

How to Think Like a Computer Scientist - Learning with Python by Allen Downey, Jeffrey Elkner, Chris Meyers - Green Tea Press, Wellesley, Massachusetts. Edited by Shannon Turlington and Lisa Cutler. Cover design by Rebecca Gimenez. Printing history: April 2002: First edition.

Unit	Chapters
1	Chapter 1 (1.1 – 1.6) 2(2.1 – 2.11)
2	Chapter 3 (3.1 – 3.13) 5 (5.1 – 5.9)
3	Chapter 6 (6.1 - 6.10)
4	Chapter 7(7.1 – 7.11) & 8 (8.1 – 8.10, 8.14-8.17)
5	Chapter 9 (9.1 – 9.9) 20(20.1- 20.8)

Reference Book

Learning Scientific Programming with Python - Christian Hill - Second Edition - 2020 -Cambridge University Press.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05AE31

05AE31	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	3	3	-	3	-	3
CLO2	9	3	3	-	3	-	3
CLO3	9	3	3	-	3	-	3
CLO4	9	3	3	-	3	-	3
CLO5	9	3	3	-	3	-	3
Weightage of the course	45	15	15		15		15
Weighted percentage of Course contribution to PLOs	3	3	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05AE31

05AE31	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	3	3	9	9
CLO2	3	3	3	9	9
CLO3	3	3	3	9	9
CLO4	3	3	3	9	9
CLO5	3	3	3	9	9
Weightage of the course	15	15	15	45	45
Weighted percentage of Course contribution to PSOs	2	1	1	9	5

Online Links

Unit – 1:
Unit – 2:
Unit – 3:
Unit – 4:
Unit – 5:

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS (Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021-22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER **- III**
Course Title **: Practical Programming in Python**		
Course Code: **05AP32**	Hours per week: 3	Credits: 2
CIA : 40 Marks	ESE : 60 Marks	Total : 100 Marks

Preamble

This course is offered for the II B.Sc Mathematics students to provide the strong foundation to write programs in Python.

List of Programs: Practical Programming in Python

1. Program to find largest among the three numbers.
2. Program to construct half Diamond star pattern.
3. Program to find Prime number.
4. Program to math function.
5. Program to implement stack.
6. Program for Fibonacci series.
7. Program to find Adam numbers.
8. Program to find perfect number.
9. Program to sorting a list of names in list.
10. Program to display the current date and time.
11. Program to find palindrome.
12. Program to find Armstrong number.
13. Program to perform addition and multiplication on two square matrixes.
14. Program to find duplicate element in the list.
15. Program to to Exception handling.

Text Book

How to Think Like a Computer Scientist - Learning with Python by Allen Downey, Jeffrey Elkner, Chris Meyers - Green Tea Press, Wellesley, Massachusetts. Edited by Shannon Turlington and Lisa Cutler. Cover design by Rebecca Gimenez. Printing history: April 2002: First edition.

Reference Book

Learning Scientific Programming with Python - Christian Hill - Second Edition - 2020 -Cambridge University Press.

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Skill Enhancement Course**		SEMESTER - **III**
Course Title **: Competitive Mathematics**		
Course Code: **05SE31**	Hours per week: 2	Credits: 2
CIA: 25 Marks	ESE: 75 Marks	Total : 100 Marks

Preamble

To develop the skills of solving problems in competitive exams.

Syllabus

UNIT I:

HCF and LCM of numbers – decimal fractions.

UNIT II:

Square roots and cube roots – averages.

UNIT III:

Problems on ages – percentage.

UNIT IV:

Profit and loss – ratio and proportion.

UNIT V:

Partnership.

Text Book

Quantitative Aptitude for Competitive Examinations by Dr. R.S. Aggarwal, S. Chand & Company Pvt. Ltd., New Delhi.

Unit	Chapters
1	Chapter 2 & 3
2	Chapter 4 & 6
3	Chapter 8 & 10
4	Chapter 11 & 12
5	Chapter 13

Reference Books

1. Quickest Mathematics – Sh.S.N.Prasad – Kiran Prabakashan Pvt. Ltd., - edition 2013.

2. Quantitative Aptitude for the CAT – Nighit K.Sinha – Pearson India education Services Pvt. Ltd., - 2017

Online Resources

https://www.slideshare.net/sivafpe/quantitative-aptitude-50079741https://www.slideshare.net/tkjainbkn/questions-of-quantitative-aptitude-tests-for-competitive-examinations-4347384 , https://youtu.be/6PCTRVmu-ek
https://youtu.be/_cW7_BUDYcw , https://youtu.be/EFcgxj_mz5Y
https://youtu.be/LX56YfljTp8 , https://youtu.be/d9BuWzlFoz8
https://youtu.be/hn9TKnr8L_8 , https://youtu.be/tnc9ojITRg4
https://youtu.be/xyyejJYeILM

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER - **IV**
Course Title **: Sequences and Series**		
Course Code: **05CT41**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the II B.Sc. Mathematics students to provide a strong foundation on the concepts in Sequences and Series.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basic concepts of sequence, inequalities. Also study the basic theorems and results.	K1
CLO 2	derive the different types of sequences.	K_2
CLO 3	study the theorems and results on sequences.	K_2, K_3
CLO 4	understand the basic concept of Series and different types of tests.	K_2,K_3
CLO 5	study the different types of convergent series and also study the power series.	K_1,K_3

K1-Remebering **K_2-Understand** **K_3-Apply**

Syllabus

UNIT-I	Intervals in R – bounded sets – least upper bound and greatest lower bound of sets – bounded functions – triangle inequalities – arithmetic, geometric and harmonic means – Cauchy-Schwarz inequality – Weierstrass' inequality – theorems only (no problems).	**(15 Hrs)**
UNIT-II	Sequences – bounded, monotonic, convergent, oscillatory, divergent sequences – algebra of limits – behavior of monotonic sequences.	**(15 Hrs)**
UNIT- III	Cauchy's first limit theorem – Ceasaro's theorem – Cauchy's second limit theorem – subsequences – limit points – Cauchy sequences (upper and lower limit of a sequence not included).	**(15 Hrs)**
UNIT- IV	Series of positive terms – convergence – Cauchy's general principle of convergence – comparison test, Kumar's test, D-Alembert's ratio test, Gauss' test, Cauchy's root test, Rape's test, Cauchy's condensation test (proofs of tests not included) – simple problems.	**(15 Hrs)**
UNIT- V	Alternating series – absolute convergence and conditional convergence – Dirichlet test – rearrangement of series – multiplication of series – power series.	**(15 Hrs)**

Text Book

Sequences and Series by Dr. S. Arumugam. New Gamma Publishing House, Palayamkottai – Reprint 2019.

Unit	Chapters
1	Chapter 1 (1.3 – 1.5) & 2 (2.3 – 2.6)
2	Chapter 3 (3.2 – 3.8)
3	Chapter 3 (3.9 – 3.12)
4	Chapter 4 (4.1 - 4.4)
5	Chapter 5 (5.1 – 5.5) & 6 (6.5)

Reference Book

Algebra by T.K.Manicavachagom pillay, T. Natarajan, K.S. Ganapathy, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT41

05CT41	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	3	3	3	3
CLO2	9	-	3	3	3	3	3
CLO3	9	-	3	3	3	3	3
CLO4	9	-	3	3	3	3	3
CLO5	9	-	3	3	3	3	3
Weightage of the course	45	-	15	15	15	15	15
Weighted percentage of Course contribution to PLOs	3	0	2	2	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT41

05CT41	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	3	9	3	9
CLO2	9	3	9	3	9
CLO3	9	3	9	9	3
CLO4	9	9	3	9	3
CLO5	9	3	9	3	9
Weightage of the course	45	21	39	27	33
Weighted percentage of Course contribution to PSOs	6	2	4	5	4

Online Resources

1. Intervals in R - https://www.youtube.com/watch?v=qDDkdjNt7h0
2. Sequences - https://www.youtube.com/watch?v=m5Yn4BdpOV0
3. Cauchy's limit theorems - https://www.youtube.com/watch?v=J1TrGerO7Yg
4. Test of Series - https://www.youtube.com/watch?v=nC_IU1IzzS4
5. Alternative series - https://www.youtube.com/watch?v=DRO1kPT4iS8

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER - **IV**
Course Title **: Statistics**		
Course Code: **05CT42**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the II B.Sc. Mathematics students to provide a strong foundation on the concepts in Statistics.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basic concepts of standard deviation, moments and skewness.	K_1, K_2
CLO 2	study the concept of correlation and regression line.	K_2
CLO 3	develop the concepts about interpolation, graphic method and algebraic method.	K_2
CLO 4	understand and apply the concept of Probability, independent events and Baye's theorem.	K_2, K_3
CLO 5	evaluate the concept of random variable, mathematical expectation and moment generating function.	K_2, K_3

K1- Remembering **K_2- Understanding** **K_3-Applying**

Syllabus

UNIT-I	Measures of Dispersion-Standard deviation - Root mean square deviation-Coefficient of variation - Variance of combined set – Moments – Skewness - Kurtosis	**(15Hrs)**
UNIT-II	Karl Perason's coefficient of correlation – covariance - Rank correlation - Spearman's formula - Regression lines	**(15Hrs)**
UNIT- III	Interpolation - Graphic method -Finite difference - Algebraic method-Newton - Gregory interpolation formula - Newton's formula for backward interpolation - Lagrange's formula	**(15Hrs)**
UNIT- IV	Probability - conditional probability - Independent events - Properties of independent events - Baye's Theorem - Boole's inequality	**(15Hrs)**
UNIT- V	Random variables-Discrete random variable-Probability density function-Continuous random variable-Mathematical expectations-Moment generating function - Cumulant generating function - Characteristic function	**(15Hrs)**

Text Book

Statistics by Dr. S. Arumugam and Prof. A. Thangapandi Isaac, (Reprint 2013) New Gamma Publishing House, Palayamkottai.

Unit	Chapters
1	Chapter 3, 4
2	Chapter 6 (Section: 6.1-6.3)
3	Chapter 7
4	Chapter 11
5	Chapter 12

Reference Book

1. Mathematical Statistics by J.N. Kapur and H.S. Saxena, S.Chand & Company Pvt. Ltd, New Delhi.
2. Basic Statistics by B. L. Agarwal, New Age International Publishers, 6th Edition.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT42

05CT42	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	--	3	9	3	3	9
CLO2	9	--	3	9	3	3	9
CLO3	9	--	3	9	3	3	9
CLO4	9	--	3	9	3	3	9
CLO5	9	--	3	9	3	3	9
Weightage of the course	45	-	15	45	15	15	45
Weighted percentage of Course contribution to PLOs	3	0	2	5	2	4	4

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT42

05CT42	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	4	4	3	5

Online Resources

https://nptel.ac.in/courses/111/105/111105041/ (Online course)
https://www.youtube.com/watch?v=3v6mYNPyDoY (Standard Deviation)
https://www.youtube.com/watch?v=d5aHrXH9Z50 (Correlation)
https://www.youtube.com/watch?v=aztcS-3MwH0 (Regression and Correlation Examples)
https://www.youtube.com/watch?v=dOr0NKyD31Q&vl=en (Random variable)

https://www.youtube.com/watch?v=BR1nN8DW2Vg (Binomial and Poisson distribution)
https://www.khanacademy.org/math/statistics-probability/modeling-distributions-of-data/more-on-normal-distributions/v/introduction-to-the-normal-distribution (Normal distribution)
https://www.youtube.com/watch?v=e4MLGaTYvBo (T-test, F-test)
https://www.khanacademy.org/math/ap-statistics/chi-square-tests/chi-square-goodness-fit/v/goodness-of-fit-example (Goodness of fit)
https://www.youtube.com/watch?v=1Ldl5Zfcm1Y (chi square test)

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER - **IV**
Course Title **: Programming in C++**		
Course Code: **05AE41**	Hours per week: 4	Credits: 3
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the II B.Sc Mathematics students to provide the strong foundation on concepts Programming in C ++

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basic concepts of object Oriented programming (OOP).	K1
CLO 2	understand the basic concepts of functions in C++.	K_2
CLO 3	understand the basic concepts of classes and objects, specifying a class and defining member function.	K_2, K_3
CLO 4	understand the basic concepts ofConstructors and destructors.	K_2
CLO 5	understand the basic concepts of inheritance and defining derived classes.	K_1, K_2

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Basic concept of object Oriented programming (OOP)- benefits of oop-application of OOP- operators in C++	**(9 Hrs)**
UNIT-II	Functions in C++-the main function –function prototyping-call by reference-return by reference- inline function – default arguments – constant arguments – function overloading – friend and virtual function – math library function	**(9 Hrs)**
UNIT- III	Classes and objects – specifying a class – defining member function – static data members – static member function-array of objects-friendly functions- returning objects	**(9 Hrs)**
UNIT- IV:	Constructors and destructors – Constructors –parameterized Constructors-multiple Constructors in a class- Constructors with default arguments- dynamic initialization of objects – copy Constructor –dynamic Constructors Constructing two-dimensional arrays – constant objects – destructors – operators overloading.	**(9 Hrs)**
UNIT- V:	Inheritance – defining derived classes – single inheritance – multilevel inheritance – hierarchical inheritance – hybrid inheritance – virtual base classes – abstract classes – constructors in derived classes	**(9 Hrs)**

Text Book

Object Oriented programming with C++ by E.Balagurusamy fourth Edition Tata Mc. Graw Hill Publishing Company Ltd, New Delhi – reprint 2016.

Unit	Chapters
1	Chapter 1 (1.5 – 1.8)
2	Chapter 4 (4.1 – 4.12)
3	Chapter 5 (5.3, 5.4, 5.11 – 5.13, 5.15, 5.16)
4	Chapter 6 (6.1 – 6.11) & 7 (7.1 – 7.5)
5	Chapter 8 (8.1 – 8.11 except 8.4)

Reference Book

The Complete Reference in C++ Tata Mc. Graw Hill Publishing Company Ltd, New Delhi

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05AE41

05AE41	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	3	3	9	3	3	3
CLO2	9	3	3	9	3	3	3
CLO3	9	3	3	9	3	3	3
CLO4	9	3	3	9	3	3	3
CLO5	9	3	3	9	3	3	3
Weightage of the course	45	15	15	45	15	15	15
Weighted percentage of Course contribution to PLOs	3	3	2	5	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05AE41

05AE41	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	3	9	9
CLO2	3	9	3	9	9
CLO3	3	9	3	9	9
CLO4	3	9	3	9	9
CLO5	3	9	3	9	9
Weightage of the course	15	45	15	45	45
Weighted percentage of Course contribution to PSOs	2	4	1	9	5

Online Resources

1. https://www.youtube.com/watch?v=OFKk8fB0MjQ – Introduction to C++
2. https://www.youtube.com/watch?v=wlXCFNuVjBY – Classes & Objects Introduction
3. https://www.youtube.com/watch?v=ATTClHbnhIk – Functions
4. https://www.youtube.com/watch?v=joAiZx3g5vk – Contractors
5. https://www.youtube.com/watch?v=1MGxvwcsK8g&t=5s - Inheritance

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER - **IV**
Course Title **: Practical Programming in C++**		
Course Code: **05AP42**	Hours per week: 2	Credits: 2
CIA : 40 Marks	ESE : 60 Marks	Total : 100 Marks

Preamble

This course is offered for the II B.Sc Mathematics students to provide the strong foundation to write programs in C ++.

List of Problems for Lab Object Oriented Programming with C++: practical

1. Program to convert Fahrenheit into Celsius.
2. Program to swap two numbers without third variable.
3. Program to find whether the given year is leap or not using ‘if…else…’ statement.
4. Program to find the commission of sales using ‘simple if’ statement.
5. Program to print odd numbers up to a range using ‘while’ loop.
6. Program to find the factorial of a given number using ‘for’ loop.
7. Program to generate Fibonacci series using ‘do…while’ loop.
8. Program to generate the pyramid of digits.
9. Program to check whether the given number is a perfect number or not.
10. Program to calculate nCr value using ‘function’.
11. Program to explain ‘function overloading’.
12. Program to find the sum of three numbers using ‘class’.
13. Program to perform various arithmetic operations using ‘member functions’ inside the ‘class’.
14. Program to display the basic details of a person using ‘class’.
15. Program to explain ‘static data members’ of ‘a class’.

Text Book

Object Oriented programming with C++ by E.Balagurusamy fourth Edition Tata Mc. Graw Hill Publishing Company Ltd, New Delhi – reprint 2016.

Reference Book

The Complete Reference in C++ Tata Mc. Graw Hill Publishing Company Ltd, New Delhi

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Skill Enhancement Course**		SEMESTER - **IV**
Course Title **: Practical: LaTex**		
Course Code: **05SE41**	Hours per week: 2	Credits: 2
CIA: 40 Marks	ESE: 60 Marks	Total: 100 Marks

Preamble

This course is offered for the II B.Sc Mathematics students to provide the strong foundation to write programs in LaTex.

List of Problems for LaTex: practical

1. Create a Simple Document in different alignments (Left, Right, Center, and Justify).
2. Create a document in LaTeX, using two-columns. Insert a title centered for the two columns.
3. create a title page in LaTeX, with the following: (i) Title of the page, (ii) Name and Addresses of two authors, (iii) Footnotes for the corresponding author; e-mail address and telephone numbers of each author, (iv) Date.
4. Type a Letter for applying a job.
5. Type your own Bio – Data.
6. Draw a Table structure.
7. Type a given Mathematical expression using Differentiation, Integration and Trigonometry.
8. Type a given Mathematical expression using all expression.
9. Type a given expression using all inequalities.
10. Type of given Article.
11. Draw any picture and insert in LateX file.
12. Type a given Question paper
13. Type a Bibliography (Or) Reference in Latex.
14. Generate different types of Mathematical Symbols and Nomenclature in Latex

Text Book

David F Griffiths and Desmond J. Higham, Learning LaTex, SIAM (Society for Industrial and Applied Mathematics) Publishers, Phidel Phia, 1996.

Reference Books

1. Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

2. L. Lamport. LATEX: A Document Preparation System, User's Guide and ReferenceManual. AddisonWesley, New York, second edition, 1994

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- V**
Course Title **: ADVANCED STATISTICS**		
Course Code: **05CT51**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc. Mathematics students to provide a strong foundation on the concepts in Advanced Statistics.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the concepts in some special distributions and its applications.	K_1, K_2
CLO 2	study the concept of test of hypothesis and test of significance for large samples .	K_1, K_2
CLO 3	illustrate sampling and Testing of Hypothesis & apply the t-test, f-test.	K_2
CLO 4	apply Chi-square test for population variance and goodness of fit.	K_2, K_3
CLO 5	study the concept of analysis of variance in different classification.	K_2, K_3

K1- Remembering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Binomial, Poisson and Normal distributions – moment generating function – mean, mode, standard deviation – recurrence relation for central moment – addition property – fitting of the distribution – area property of normal distribution – limiting cases.	**(15Hrs)**
UNIT-II	Tests of significance (large samples) - Sampling-Testing of hypothesis - Test of significance for proportions and percentages - Test of significance for means - Test of significance for difference of sample means - Test for standard deviation - Test of significance for correlation coefficient.	**(15Hrs)**
UNIT- III	Tests of significance (small samples) **–** tests of significance based on t-test, F-test.	**(15Hrs)**
UNIT- IV	Tests of significance based on χ^2 - distribution–Chi-square test for population variance – goodness of fit – independence of attributes.	**(15Hrs)**
UNIT- V	Analysis of variance - One criterion of classification - Two criteria of classification - Latin square.	**(15Hrs)**

Text Book

Statistics by Dr. S. Arumugam and Prof. A. Thangapandi Isaac, (Reprint 2013) New Gamma Publishing House, Palayamkottai.

Unit	Chapters
1	Chapter 13
2	Chapter 14 (14.1 -14.3)
3	Chapter 15 (15.1,15.2)
4	Chapter 16
5	Chapter 17

Reference Books

1. Mathematical Statistics by J.N. Kapur and H.S. Saxena, S.Chand & Company Pvt. Ltd, New Delhi.
2. Basic Statistics by B. L. Agarwal, New Age International Publishers, 6th Edition.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT51

05CT51	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	9	9	3	9
CLO2	9	-	3	9	9	3	9
CLO3	9	-	3	9	9	3	9
CLO4	9	-	3	9	9	3	9
CLO5	9	-	3	9	9	3	9
Weightage of the course	45	-	15	45	45	15	45
Weighted percentage of Course contribution to PLOs	3	0	2	5	5	4	4

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT51

05CT51	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	4	4	3	5

Online Resources

https://www.youtube.com/watch?v=dOr0NKyD31Q&vl=en (Random variable)
https://www.youtube.com/watch?v=BR1nN8DW2Vg (Binomial and Poisson distribution)
https://www.khanacademy.org/math/statistics-probability/modeling-distributions-of-data/more-on-normal-distributions/v/introduction-to-the-normal-distribution (Normal distribution)
https://www.youtube.com/watch?v=e4MLGaTYvBo (T-test, F-test)
https://www.khanacademy.org/math/ap-statistics/chi-square-tests/chi-square-goodness-fit/v/goodness-of-fit-example (Goodness of fit)
https://www.youtube.com/watch?v=1Ldl5Zfcm1Y (chi square test)

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- V**
Course Title **: MODERN ALGEBRA**		
Course Code: **05CT52**	Hours per week: 5	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III year students to provide the strong foundation on concepts Modern Algebra

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the Relations and Mappings	K1
CLO 2	understand the groups and its properties	K_2
CLO 3	apply the properties of a group in the Order of an element	K_2, K_3
CLO 4	understand the Isomorphism and apply it in theorems	K_2
CLO 5	understand the elementary properties of Rings and ideals	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Relations and Mappings	**(15 Hrs)**
UNIT-II	Definition of groups – examples – elementary – properties - permutation groups - subgroups.	**(15 Hrs)**
UNIT- III	Order of an element - Cosets and Lagrange's theorem - normal sub groups - quotient groups.	**(15 Hrs)**
UNIT- IV	Isomorphism and homomorphism of groups	**(15 Hrs)**
UNIT- V	Rings – definition - elementary properties – isomorphism - types of rings - characteristics of ring - subrings and ideals - quotient rings - maximal and prime ideals	**(15 Hrs)**

Text Book

Modern Algebra by Dr.S. Arumugam and prof. A. Thangapandi Isaac, Scitech Publication Pvt. Ltd., Chennai – Reprint 2020.

Unit	Chapters
1	Chapter 2 (2.1 – 2.5)
2	Chapter 3 (3.0 – 3.5)
3	Chapter 3 (3.7 – 3.9)
4	Chapter 3 (3.10 – 3.11)
5	Chapter 4 (4.1 – 4.9)

Reference Book

Modern Algebra by M.L. Santiago, Tata McGraw Hill publishing Company Pvt. Ltd., New Delhi.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT52

05CT52	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	-	3	-	3
CLO2	9	-	3	-	3	-	3
CLO3	9	-	3	-	3	-	3
CLO4	9	-	3	-	3	-	3
CLO5	9	-	3	-	3	-	3
Weightage of the course	45		15		15		15
Weighted percentage of Course contribution to PLOs	3	0	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT52

05CT52	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	4	4	3	5

Online Resources

1. Relations & mappings - https://www.youtube.com/watch?v=OxZ0JL4Bjzk
2. Groups - https://www.youtube.com/watch?v=yHq_yzYZV6U
3. Order of an element - https://www.youtube.com/watch?v=OWTKYLAEYvY
4. Isomorphism & Homomorphism - https://www.youtube.com/watch?v=yLW8WPPv03M
5. Rings - https://www.youtube.com/watch?v=j_f7O-4Rb9U

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- V**
Course Title **: REAL ANALYSIS**		
Course Code: **05CT53**	Hours per week: 5	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to acquire the basic knowledge in pure analysis.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the concepts of sets and its properties of elements.	K_1
CLO 2	obtain the concepts of Open & Closed sets and its properties.	K_2
CLO 3	develop the concepts about the metric on sets, spaces and functions.	K_2, K_3
CLO 4	examine the concepts of metric on connected spaces and its applications.	K_2, K_3
CLO 5	evaluate the concepts on compact metric spaces and its applications.	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Countable sets – uncountable sets – inequalities of Holder and Minkowski. Metric spaces – definition and examples – bounded sets in a metric space – open ball in a metric space – open sets.	**(15 Hrs)**
UNIT-II	Sub spaces – interior of a set – closed sets – closure – limit point – dense sets.	**(15 Hrs)**
UNIT- III	Complete metric space – Baire's category theorem – continuity – homeomorphism – uniform continuity.	**(15 Hrs)**
UNIT- IV	Connectedness – definition and examples – connected subsets of R – connectedness and continuity.	**(15 Hrs)**
UNIT- V	Compactness – compact space – compact subsets of R – equivalent characterization for compactness – compactness and continuity.	**(15 Hrs)**

Text Book

Modern Analysis by Dr.S. Arumugam, and A. Thangapandi Issac, New Gamma Publishing House – First reprint 2019.

Unit	Chapters
1	Chapter 1 (1.2 – 1.4) & 2 (2.1 – 2.4)
2	Chapter 2 (2.5 – 2.10)
3	Chapter 3 (3.1 – 3.2) & 4 (4.1 – 4.3)
4	Chapter 5 (5.1 – 5.3)
5	Chapter 6 (6.1 – 6.4)

Reference Book

Principles of Real Analysis by Chandra Sekara Rao.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT53

05CT53	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	3	3	3	3
CLO2	9	-	3	3	3	3	3
CLO3	9	-	3	3	3	3	3
CLO4	9	-	3	3	3	3	3
CLO5	9	-	3	3	3	3	3
Weightage of the course	45	-	15	15	15	15	15
Weighted percentage of Course contribution to PLOs	3	0	2	2	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT53

05CT53	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	3	9	3	9
CLO2	9	3	9	3	9
CLO3	9	3	9	9	3
CLO4	9	9	3	9	3
CLO5	9	3	9	3	9
Weightage of the course	45	21	39	27	33
Weighted percentage of Course contribution to PSOs	6	2	4	5	4

Online Resources

1. https://www.youtube.com/watch?v=p0bKyR9fjFI – Countable sets - Introduction
2. https://www.youtube.com/watch?v=etP21xln8iQ – Metric spaces
3. https://www.youtube.com/watch?v=X_weB_pYMV4 – Complete Metric space
4. https://www.youtube.com/watch?v=DHPHlxWHe3w – Connectedness
5. https://www.youtube.com/watch?v=L2Mfyi74ykM – Compactness

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- V**
Course Title **: MECHANICS**		
Course Code: **05CT54**	Hours per week: 6	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc. Mathematics students to provide a strong foundation on the concepts in Mechanics.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	remember the parallelogram law, triangle law, Lami's theorem and resolved parts.	K_1, K_2
CLO 2	explain the concept of like and unlike parallel forces, condition of equilibrium, Varigon's theorem and couples.	K_1, K_2
CLO 3	interpret the concept of system of coplanar forces and equation to the line of action of the resultant and apply it to various problems.	K_2, K_3
CLO 4	study the basic concepts path, range, height and time of flight of the projectile.	K1
CLO 5	study the concepts of Simple Harmonic Motion (S.H.M) and simple pendulum. Also using these to find the composition of two S.H.M .	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Forces acting at a point – parallelogram law of forces – triangle law of forces – polygon law of forces – Lami's theorem – (λ-μ)– theorem – resolution of forces – components of forces – resolved parts – resultant of any number of forces acting at a point – condition of equilibrium of any number of forces acting at a point.	**(18Hrs)**
UNIT-II	Parallel forces and moments – resultant of two like and unlike parallel forces – conditions of equilibrium of three coplanar parallel forces – moment of a force – geometrical representation of moment – Varignon's theorem – generalized theorem – moment of a force about an axis – couple – equilibrium of two couples – equivalence of two couples – couples in parallel planes – resultant of coplanar couples – resultant of a couple and a force.	**(18Hrs)**

UNIT- III	Equilibrium of three forces acting on a rigid body – conditions of equilibrium – two trigonometrical theorems – solving statical problems (simple problems) – coplanar forces – reduction of coplanar forces – conditions for a system of coplanar forces to reduce to a single force or to a couple – equation to the line of action of the resultant – conditions of equilibrium of a system of coplanar forces (simple problems only).	**(18Hrs)**
UNIT- IV	Projectiles – path of the projectile, range, etc. – velocity of the projectile in magnitude and direction at the end of time t – range on an inclined plane – enveloping parabola.	**(18Hrs)**
UNIT- V	Simple Harmonic Motion – solution of S.H.M equation – geometrical representation of S.H.M – composition of two simple harmonic motions. Simple pendulum – equivalent simple pendulum – seconds pendulum.	**(18Hrs)**

Text Books

1. Statics by M.K. Venkataraman -Agasthiar publications Trichy (Eighteenth edition, AUG-2016).
2. Dynamics by M.K. Venkataraman – Agasthiar Publications Trichy (Eighteenth edition, JAN-2017)

Unit	Book	Chapter
1	1	2
2		3
3		4,5
4	2	6
5		10

Reference Book

Mechanics by P.Duraipandian, LaxmiDuraipandian, S.Chand and company

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT54

05CT54	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	--	3	9	9	3	9
CLO2	9	--	3	9	9	3	9
CLO3	9	--	3	9	9	3	9
CLO4	9	--	3	9	9	3	9
CLO5	9	--	3	9	9	3	9
Weightage of the course	45	-	15	45	45	15	45
Weighted percentage of Course contribution to PLOs	3	0	2	5	5	4	4

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT54

05CT54	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	4	4	3	5

Online Resources

Unit I: https://youtu.be/hPo3Fl_ZQdY,
https://youtu.be/QR3hWAmvfl0
Unit II: https://youtu.be/7CT71KheA-I,
https://youtu.be/mfz5riQ_zxU,
https://youtu.be/ThRrY9zt-dw
https://youtu.be/mGgBOGF6sXc
Unit III: https://youtu.be/j8qz1rAyfxo,
https://youtu.be/QAgwJYOaDqM,
https://youtu.be/0IbEe-1XJtY
Unit IV: https://youtu.be/3Pb9uPmzZ0k Projectile Motion
Unit V: https://youtu.be/ED6F8u_sLC4 Simple Harmonic Motion

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Discipline Specific Elective**		SEMESTER **- V**
Course Title **: LINEAR PROGRAMMING**		
Course Code: **05DS5A**	Hours per week: 5	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to acquire the basic knowledge in LINEAR PROGRAMMING.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	gain the basic concepts &ideas of LPP, forming mathematical model and solving LPP by graphically.	K1, K3
CLO 2	obtain the optimal solution for more than two variables in LPP by using simplex method.	K2
CLO 3	apply dual problem method to reduce the complexity of solving LPP.	K2
CLO 4	learn the various methods to solve transportation problem and find feasible & optimal solution.	K3
CLO 5	acquire fundamental knowledge and to find the optimal solution for assignment problem and game theory.	K3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Linear Programming Problem – mathematical formulation of the problem – LPP-graphical solution method – some exceptional cases – general LPP – canonical, standard forms of LPP.	**(15 Hrs)**
UNIT-II	LPP-simplex method – fundamental properties of solutions – the computational procedure – use of artificial variables – two phase method – penalty (Big-M) method.	**(15 Hrs)**
UNIT- III	Duality in linear programming – general primal-dual pair – formulating dual problem – primal-dual pair in matrix form – duality and simplex method.	**(15 Hrs)**
UNIT- IV	Transportation problem (TP) – general transportation problem – the transportation table – duality in transportation table – loops in transportation tables – formulation of the TP – solution of a TP – north west corner method – least cost method – Vogel's approximation method – degeneracy in TP – transportation algorithm (modi method) - unbalanced TP.	**(15 Hrs)**
UNIT- V	Assignment problem – mathematical formulation of the problem – the assignment method – special cases in assignment problems – games and strategies – two person zero-sum games – some basic terms – the maxmin, minmax principle –saddle points – graphic solution – dominance property	**(15 Hrs)**

Text Book

Operations Research by Kanti Swarup, P.K.Gupta, Man Mohan. Publisher: Sultan Chand & sons company Pvt. Ltd., New Delhi – 17th Edition 2014.

Unit	Chapters
1	Chapter 2 (Section: 2.1-2.4) & Chapter 3 (Section: 3.1-3.5)
2	Chapter 4 (Section: 4.1-4.4)
3	Chapter 5 (Section: 5.1-5.4, 5.7)
4	Chapter 10 (Section: 10.1-10.2, 10.4-10.6, 10.8,10.9, 10.12, 10.13, 10.15 (unbalanced problem))
5	Chapter 11 (Section: 11.1-11.4) & Chapter 17 (Section: 17.1-17.7)

Reference Book

Operations Research by J.K.Sharma, Macmillan Publication India Pvt. Ltd., New Delhi.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05DS5A

05DS5A	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	9	3	3	3
CLO2	9	-	3	9	3	3	3
CLO3	9	-	3	9	3	3	3
CLO4	9	-	3	9	3	3	3
CLO5	9	-	3	9	3	3	3
Weightage of the course	45	-	15	45	15	15	15
Weighted percentage of Course contribution to PLOs	3	0	2	5	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05DS5A

05DS5A	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	9	9	3	9	9
CLO3	3	3	3	3	9
CLO4	9	9	9	3	3
CLO5	9	3	3	3	3
Weightage of the course	39	33	27	21	27
Weighted percentage of Course contribution to PSOs	5	3	3	4	3

Online Resources

Graphical Method :https://youtu.be/O6QO3J_85as
https://www.slideshare.net/kratikadhoot/graphical-method-17041901 ,
Simplex Method: https://www.slideshare.net/luckshaybatra/big-m-method-50087400,
https://youtu.be/zJhncZ5XUSU, https://youtu.be/MZ843Vvia0A, https://youtu.be/SNc9NGCJmns
https://youtu.be/SNc9NGCJmns , https://www.slideshare.net/sachin.mk/simplex-method
Dual Simplex method: https://youtu.be/KLHWtBpPbEc ,
https://www.slideshare.net/HishamAlKurdi1/operations-research-the-dual-simplex-method

Transportation Problem: https://youtu.be/ItOuvM2KmD4,
https://www.slideshare.net/VishalHotchandani2/transportation-problems-183454172
Assignment Problem: https://youtu.be/rrfFTdO2Z7I
https://www.slideshare.net/NakulBhardwaj1/assignment-problem-52928205https://www.slideshare.net/abubashars/assignment-problem-18034506
Game theory: https://youtu.be/fSuqTgnCVRg , https://youtu.be/YJvbxAvxkDc
https://youtu.be/KUskbAasVCY , https://www.slideshare.net/kapooranushka/game-theory-ppt-44074043

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Discipline Specific Elective**		SEMESTER **- V**
Course Title **: Combinatorics**		
Course Code: **05DS5B**	Hours per week: 5	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc. Mathematics students to provide a strong foundation on the concepts in Combinatorics.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	relate and apply sum and product rules.	K1, K3
CLO 2	analyze and solve problems related to Permutation and Combination.	K3
CLO 3	make use of Inclusion-Exclusion Principle to solve problems on generalized permutation and combination	K3
CLO 4	demonstrate ordinary and exponential generating functions	K2
CLO 5	solve the problems using Recurrence Relations.	K3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	The Sum Rule and the Product Rule – The Pigeonhole Principle - Solved Problems on The Sum Rule and the Product Rule - Solved Problems on The Pigeonhole Principle.	**(15Hrs)**
UNIT-II	Permutations and Combinations -Solved Problems on Permutations and Combinations.	**(15Hrs)**
UNIT- III	Generalized Permutations and Combinations –The Inclusion-Exclusion Principle - Solved Problems on Generalized Permutations and Combinations - Solved Problems on The Inclusion- Exclusion Principle - Solved Problems on Generalized Inclusion-Exclusion Principle.	**(15Hrs)**
UNIT- IV	Ordinary and Exponential Generating Functions - Solved Problems on Ordinary Generating Functions -Solved Problems on Exponential Generating Functions.	**(15Hrs)**
UNIT- V	Recurrence Relations- Solved Problems on Recurrence Relations and Associated Generating Functions.	**(15Hrs)**

Text Book

Balakrishnan. V.K., 1995, Theory and Problems of Combinatorics, Schaum's Outline Series, McGraw-Hill, Inc., Singapore.

Unit	Chapter/Sections
I	Chapter 1(1.1,1.3)
II	Chapter 1(1.2)
III	Chapter 2 (2.1, 2.3)
IV	Chapter 3 (3.1)
V	Chapter 3 (3.3)

Reference Books

1. Alan Tucker, 2012, Applied Combinatorics, 6th Edition, Wiley, New Jersey.
2. Ralph P. Grimaldi, and Ramana. B.V., 2004, Discrete and Combinatorial Mathematics, Pearson Education, Inc., Copyright 2007, Dorling Kindersley (India) Pvt.Ltd.
3. Krishnamurthy. V., 1985, Combinatorics Theory and Applications, East- West Press Pvt. Ltd.,

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05DS5B

05DS5B	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	3	3	-	3	-	3
CLO2	9	3	3	-	3	-	3
CLO3	9	3	3	-	3	-	3
CLO4	9	3	3	-	3	-	3
CLO5	9	3	3	-	3	-	3
Weightage of the course	45	15	15	0	15	0	15
Weighted percentage of Course contribution to PLOs	3	3	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05DS5B

05DS5B	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	9	9	9	3	3
CLO3	9	9	9	3	3
CLO4	9	9	9	3	3
CLO5	9	9	9	3	3
Weightage of the course	45	45	45	15	15
Weighted percentage of Course contribution to PSOs	6	4	4	3	2

Online Resources

Unit I https://www.slideshare.net/rafayfarooq/combinatorics-15052419, https://youtu.be/8tjKH_ODkj0

Unit II https://www.slideshare.net/PuruAgrawal/permutation-combination-34818145, https://youtu.be/b5bOWQ7VpsE

Unit III https://slideplayer.com/slide/9741448/ ,

https://www.powershow.com/view/1c9d3-Nzc3Y/Generalized_Permutations_and_Combinations_powerpoint_ppt_presentation, https://youtu.be/_kmhJgBbUwI

Unit IV https://www.slideshare.net/preethicsekongu/generating-function-121065926, https://youtu.be/YSMRaMZaySw

Unit V https://www.slideshare.net/chinnucheela/recurrence-relations, https://youtu.be/MB_Gy2HIMhU

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Skill Enhancement Course**		SEMESTER **- V**
Course Title **: Practical: MatLab**		
Course Code: **05SE51**	Hours per week: 2	Credits: 2
CIA: 40 Marks	ESE: 60 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc Mathematics students to provide the strong foundation to write programs in MatLab.

List of Problems for MatLab: practical

1. Bar chart
2. Pei chart
3. Find roots of the polynomials
4. Fibonacci sequence
5. Convert Fahrenheit to Celsius
6. Matrix arithmetic operations
7. Matrix transpose and inverse
8. Solving linear equations
9. Eigen values and Eigen vectors
10. 2D plot
11. Multiple data sets in one plot
12. Simple 3D plot

Text Book

Rudra Pratap, Getting started with MATLAB, Oxford university press.

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Common Subject Theory**		SEMESTER **- V**
Course Title **: Environmental studies**		
Course Code: **ESUG51**	Hours per week: 2	Credits: 2
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

- Disseminate information of Environment of national and international issues
- Environmental consciousness creation among the students
- Facilitation of environmental leadership among students

Syllabus

Unit-I:

Introduction – Nature, scope and importance of Environmental studies – Natural Resources and conservation – forest, water and energy.

Unit-II:

Ecosystem – concept – structure and function, energy flow, food chain, food web and ecological pyramids

Unit-III:

Biodiversity – definition, types – values – India, a mega diversity zone – Hotspots – Endangered and endemic species – threat to biodiversity and conservation

Unit-IV:

Environmental pollution – Air pollution- causes and effect – Ozone depletion – Global warming – acid rain – Water pollution – Noise pollution – Solid waste management – Nuclear hazard

Unit-V:

Human population and the environment – Population growth – variation among nations – effects of population explosion – family welfare programme – environment and human health.

Text Book

Environment studies by R.Murugesan, 2009 edition, Milleneum Publication., Madurai-16.

Online Links

Unit – 1:
Unit – 2:
Unit – 3:
Unit – 4:
Unit – 5:

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **-VI**
Course Title **: LINEAR ALGEBRA**		
Course Code: **05CT61**	Hours per week: 5	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc. Mathematics students to provide a strong foundation on the concepts in Linear Algebra.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basics concept in vector space and linear transformation.	K_1,K_2
CLO 2	understand the inner product space & develop the concepts of vector inner product spaces in orthogonal and orthogonal complement.	K_1, K_3
CLO 3	explain the theory of matrices and different types and also apply to solve the inverse of a matrix and rank of a matrix.	K_2, K_3
CLO 4	understand the simultaneous linear equation and apply to it in eigen values & eigen vectors.	K_2, K_3
CLO 5	illustrate the matrix of a linear transformation and apply the bilinear forms and quadratic forms.	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Vector spaces – definition and examples – subspaces – linear transformation – span of a set – linear independence – basis and dimension – rank and nullity.	**(15 Hrs)**
UNIT-II	Inner product spaces – definition and examples – orthogonality – orthogonal complement.	**(15 Hrs)**
UNIT- III	Theory of matrices – algebra of matrices – types of matrices – the inverse of a matrix – elementary transformations – rank of a matrix.	**(15 Hrs)**
UNIT- IV	Simultaneous linear equations – characteristic equation – Cayley Hamilton theorem – eigen values and eigen vectors.	**(15 Hrs)**
UNIT- V	Matrix of a linear transformation – relation between multiplication of matrices and the composition of their linear transformations – bilinear forms – quadratic forms.	**(15 Hrs)**

Text Book

Modern Algebra by Dr.S. Arumugam and A. Thangapandi Issac, (Reprint 2018) Scitech Publications, Chennai.

Unit	Chapters
1	Chapter 5 (Section: 5.1-5.7)
2	Chapter 6
3	Chapter 7 (Section: 7.1-7.5)
4	Chapter 7 (Section: 7.6-7.8)
5	Chapter 5 (Section: 5.8) & 8

Reference Book

Linear Algebra by S.kumaresan, Prentice publications.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT61

05CT61	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	--	3	9	9	3	9
CLO2	9	--	3	9	9	3	9
CLO3	9	--	3	9	9	3	9
CLO4	9	--	3	9	9	3	9
CLO5	9	--	3	9	9	3	9
Weightage of the course	45	-	15	45	45	15	45
Weighted percentage of Course contribution to PLOs	3	0	2	5	5	4	4

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT61

05CT61	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	4	4	3	5

Online Resources

https://nptel.ac.in/courses/111/106/111106051/ (Online Course)
https://nptel.ac.in/courses/111/104/111104137/ (Online Course)
https://nptel.ac.in/courses/111/101/111101115/ (Online Course)
https://www.youtube.com/watch?v=XDvSsDsLVLs (Vector Space)
https://www.youtube.com/watch?v=UUmoluM0D-M (Inner Product Space)
https://www.youtube.com/watch?v=IxIl0xpLf1A (Matrix)
https://www.khanacademy.org/math/linear-algebra/alternate-bases/eigen-everything/v/linear-algebra-introduction-to-eigenvalues-and-eigenvectors (Eigen Values and Eigen Vectors)
https://www.youtube.com/watch?v=9t_c0G_Dcfg (Bilinear Form)

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Core Course**		SEMESTER **- VI**
Course Title **: COMPLEX ANALYSIS**		
Course Code: **05CT62**	Hours per week: 6	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to acquire the basic knowledge in complex analysis.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the basics in transformations or mappings on complex field among two different fields.	K_1
CLO 2	obtain the Cauchy Riemann equations on analytic functions and its applications for some standard theorems.	K_2
CLO 3	develop the concepts in Cauchy theorems in complex integrations and its applications.	K_2, K_3
CLO 4	analysis the series expansions of different types and the concepts of singularities with its applications.	K_2, K_3
CLO 5	evaluate the concepts of residues on analytic functions and the development of contour theorems using residues.	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Elementary transformations – bilinear transformations – cross ratio – fixed points of a bilinear transformation –bilinear transformations which map the real axis onto itself, unit circle onto itself, real axis onto the unit circle.	**(18 Hrs)**
UNIT-II	Cauchy Riemann equations – complex form of C.R. equations – C.R. equations in polar co-ordinates – analytic functions – harmonic functions – Laplace equation –finding conjugate harmonic of an analytic function – Milne-Thompson method.	**(18 Hrs)**
UNIT- III	Complex integration – definite integral – length of a curve – Cauchy's theorem – simply connected and multiply connected regions – Cauchy's integral formula – maximum modulus theorem – higher derivatives – derivative of an analytic function is analytic – Cauchy's inequality – Liouville's theorem – fundamental theorem of algebra – Morera's theorem.	**(18 Hrs)**
UNIT- IV	Series expansions – Taylor's theorem – Taylor's series – Maclaurin's series – Laurent's theorem – Laurent's series – zeros of an analytic function – order of a zero – singular points – isolated singularity – removable singularity – poles – order of a pole-simple pole – double pole – essential singularities.	**(18 Hrs)**
UNIT- V	Calculus of residues – residues – Cauchy's residue theorem – argument theorem – Rouche's theorem – fundamental theorem of algebra – evaluation of definite integrals – contour integration (problems only).	**(18 Hrs)**

Text Book

Complex Analysis by Dr.S. Arumugam, A. Thangapandi Issac and A.Somasundaram. Scitech Publication, Chennai – Reprint 2017.

Unit	Chapter/Sections
I	Chapter 3 (3.1 – 3.5)
II	Chapter 2(2.6 – 2.8)
III	Chapter 6 (6.1 – 6.4)
IV	Chapter 7 (7.1 – 7.4)
V	Chapter 8 (8.1 – 8.3)

Reference Books

1. Complex Analysis by Dr.T.K. Manickavachagampillay, S.Viswanathan printers and publishers Pvt. Ltd.
2. Complex Analysis by Dr. Durai Pandian and others. Emerald Publishers, Chennai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05CT62

05CT62	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	9	3	3	3
CLO2	9	-	3	9	3	3	3
CLO3	9	-	3	9	3	3	3
CLO4	9	-	3	9	3	3	3
CLO5	9	-	3	9	3	3	3
Weightage of the course	45	-	15	45	15	15	15
Weighted percentage of Course contribution to PLOs	3	0	2	5	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05CT62

05CT62	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	3
CLO2	3	9	9	3	3
CLO3	3	9	9	3	3
CLO4	3	9	9	3	3
CLO5	3	9	9	3	3
Weightage of the course	15	45	45	15	15
Weighted percentage of Course contribution to PSOs	2	4	4	3	2

Online Resources

1. https://www.youtube.com/watch?v=WGq0PgUR_2Q – Bilinear transformation
2. https://www.youtube.com/watch?v=uguhyTIHQRk – conformal mappings
3. https://www.youtube.com/watch?v=G7b9NeujYPo - Residues in Complex Analysis
4. https://www.youtube.com/watch?v=2Ka7oHTONhc - Cauchy residues theorem
5. https://www.youtube.com/watch?v=YK1Cq_qEFGo - Contour integration

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Discipline Specific Elective**		SEMESTER - **VI**
Course Title **: GRAPH THEORY**		
Course Code: **05DS6A**	Hours per week: 5	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc. Mathematics students to provide a strong foundation on the concepts in Graph Theory.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	remember the basic definitions like Graphs, Sub graphs, Degree of a vertex, Covering and Independent sets	K_1, K_2
CLO 2	understand the facts and idea by the Degree sequence, Graphic sequence, connectedness of a graph.	K_1, K_2
CLO 3	give the description to the concept of Eulerian and Hamiltonian graphs and apply it to find whether the given graph is Eulerian or Hamiltonian.	K_2, K_3
CLO 4	understand the concept of Matching apply it to prove the theorem like Halls marriage theorem.	K_2, K_3
CLO 5	classify the concept of Colourability and chromatic number and apply it to solve problems like Four Colour Problem.	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Graphs and subgraphs – definition and examples – degrees – sub graphs – isomorphism between graphs – Ramsey numbers – independent sets and coverings – intersection graphs and line graphs – matrix of a graph – operations on graphs.	**(15 Hrs)**
UNIT-II	Degree sequences – graphic sequences – connectedness – walks, trails and paths – connectedness and components – blocks – connectivity.	**(15 Hrs)**
UNIT- III	Eulerian graphs – Hamiltonian graphs – trees – characterization of trees – centre of a tree.	**(15 Hrs)**
UNIT- IV	Matchings – matchings in bipartite graphs – planarity – definition and properties – characterization of planar graphs – thickness, crossings and outer planarity.	**(15 Hrs)**

UNIT- V	Colourability – chromatic number and chromatic index – five colour theorem – four colour problem – chromatic polynomials.	**(15 Hrs)**

Text Book

An invitation to Graph Theory by Dr. S. Arumugam & S. Ramachandran, (Chapter: 2, 3, 4, 5, 6, 7, 8, 9) (2013 Edition) Scitech Publishing Company, Chennai.

Reference Book

Graph Theory by Frank Harary, Publisher, Addison – Wesley Publishing Company, New Delhi.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05DS6A

05DS6A	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	-	3	-	3
CLO2	9	-	3	-	3	-	3
CLO3	9	-	3	-	3	-	3
CLO4	9	-	3	-	3	-	3
CLO5	9	-	3	-	3	-	3
Weightage of the course	45	-	15	-	15	-	15
Weighted percentage of Course contribution to PLOs	3	0	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05DS6A

05DS6A	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	4	4	3	5

Online Resources

https://youtu.be/f1JTtMP6NGw (Graph Theory: Introduction)
https://youtu.be/E40r8DWgG40 (Basic concepts in Graph theory)
https://youtu.be/kKoIABvlmfY (Bipartite Graph)
https://youtu.be/Gc8emFk-2vc (Vertex cover and independent set)
https://youtu.be/leAsOJZvcVo (Connected/Disconnected Graph)
https://youtu.be/LV4VgNWiZTA (Subgraphs - Spanning & Induced Subgraphs)
https://youtu.be/lk5-dlvUhLE (Graph Isomorphism with example)
https://youtu.be/xqAI58pDduk (Hamiltonian Graph with example)
https://youtu.be/ZlMirH-YQcU (Eulerian Graph with example)
https://youtu.be/HmQR8Xy9DeM (Graph theory)

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Discipline Specific Elective**		SEMESTER **- VI**
Course Title **: Cryptography**		
Course Code: **05DS6B**	Hours per week: 5	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc. Mathematics students to provide a strong foundation on the concepts in Cryptography.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	recall the fundamentals of cryptography	K1
CLO 2	demonstrate standard cryptographic algorithms used to analyze confidentiality, integrity and authenticity.	K2,K3
CLO 3	list and Identify the security issues in the network, key distribution and management schemes.	K1, K3
CLO 4	design encryption techniques to secure data in transit networks.	K3
CLO 5	evaluate security mechanisms in theory of networks	K3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Introduction: Security goals – Cryptographic attacks – Services and mechanism –Techniques. Mathematics of Cryptography: Integer arithmetic – Modular arithmetic – Matrices –Linear congruence.	**(15Hrs)**
UNIT-II	Traditional symmetric – Key ciphers: Introduction – Substitution ciphers-Transposition ciphers – Stream and block ciphers.	**(15Hrs)**
UNIT- III	Mathematics of symmetric – Key cryptography: Algebraic structures **–** GF (2^n) Fields Introduction to modern symmetric – Key ciphers: Modern block ciphers – Modern stream ciphers.	**(15Hrs)**
UNIT- IV	Data Encryption Standard (DES): Introduction – DES structure – DES analysis – Security of DES – Multiple DES (Conventional Encryption Algorithms) – Examples of block ciphers influenced by DES.	**(15Hrs)**
UNIT- V	Advanced Encryption Standard (AES): Introduction – Transformations – Key expansion – The AES Ciphers – Examples – Analysis of AES.	**(15Hrs)**

Text Book

Behrouz A. Forouzan and Debdeep Mukhopadhyay, 2013, Cryptography and Network Security, 2nd Edition, McGraw Hill Education (India) Private Limited, New Delhi.

Unit	Chapter/Sections
I	Chapter 1(1.1-1.4), 2(2.1 – 2.4)
II	Chapter 3(3.1-3.4)
III	Chapter 4(4.1-4.2), 5(5.1- 5.2)
IV	Chapter 6(6.1- 6.6)
V	Chapter 7(7.1-7.6)

Reference Books

1. Atul Kahate, 2014, Cryptography and Network Security, Third Edition, McGraw Hill Education (India) Private Limited, New Delhi.

2. Bruce Schneier, 2012, Applied Cryptography: Protocols, Algorithms and Source code in C, 2nd Edition, Wiley India New Delhi.

3. Stallings, 2013, Cryptography and Network Security: Principles and Practice, Sixth Edition, Pearson Education, New Delhi, India.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05DS6B

05DS6B	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	3	3	-	3	-	3
CLO2	9	3	3	-	3	-	3
CLO3	9	3	3	-	3	-	3
CLO4	9	3	3	-	3	-	3
CLO5	9	3	3	-	3	-	3
Weightage of the course	45	15	15	0	15	0	15
Weighted percentage of Course contribution to PLOs	3	3	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05DS6B

05DS6B	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	9	9	9	3	3
CLO3	9	9	9	3	3
CLO4	9	9	9	3	3
CLO5	9	9	9	3	3
Weightage of the course	45	45	45	15	15
Weighted percentage of Course contribution to PSOs	6	4	4	3	2

Online Resources

https://youtu.be/sjje0UOLckg https://youtu.be/cqgtdkURzTE
https://youtu.be/2aHkqB2-46k https://youtu.be/V67drkkk2aA
https://youtu.be/BEb_AnPWPwY https://youtu.be/4-hqo4XzdLc
https://www.slideshare.net/AfifAlMamun/introduction-to-cryptography-72587472,
https://www.slideshare.net/SamBowne/ch-12-cryptography,
https://www.slideshare.net/thaihongkg/cryptography-and-applications

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Discipline Specific Elective**		SEMESTER **- VI**
Course Title **: OPERATIONS RESEARCH**		
Course Code: **05DS6C**	Hours per week: 6	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc. Mathematics students to provide a strong foundation on the concepts in Operation Research.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	remember the fundamental concepts of stock and its types and get more ideas about solving deterministic and probabilistic inventory model.	K1
CLO 2	understand the different types queuing systems and its classifications.	K_1 , K_2
CLO 3	construct the network diagram and applying network models in diverse simple real life problems.	K_2 , K_3
CLO 4	apply Sequencing techniques for processing of jobs by machines in systematic manner.	K_3
CLO 5	use the replacement policy methods, to estimate the replacement time when the value of money does not change with time and changes with time.	K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Inventory control – cost associated with inventories – factors affecting inventory control – Economic Order Quantity (EOQ) – deterministic inventory problems with no shortages – probabilistic inventory problems.	**(18 Hrs)**
UNIT-II	Queuing theory – elements of queuing system and characteristics of queuing system – probability distribution in queuing systems – classification of queuing models – Poisson queuing systems (M / M / 1) : (∞ / FIFO), (M / M / 1) : (N / FIFO).	**(18 Hrs)**
UNIT- III	Network scheduling by PERT/CPM – network and basic components – logical sequence – rules of network construction – numbering the events – critical path analysis – probability consideration in PERT – distinction between PERT and CPM.	**(18 Hrs)**
UNIT- IV	Sequencing problems – problem of sequencing – basic terms used in sequencing – processing n jobs through two machines – processing n jobs through k machines – processing two jobs through k machines.	**(18 Hrs)**

UNIT- V	Replacement problem and system reliability – replacement of equipment/asset that deteriorates gradually – replacement policy when the value of money does not change with time – replacement policy when value of money changes with time.	**(18 Hrs)**

Text Book

Operations Research by Kanti Swarup, P.Kapur, Gupta and Man Mohan (19th Edition 2017), Sultan Chand & Sons Publishers, New Delhi.

Unit	Chapters
1	Chapter 19 (Section: 19.1-19.10) and 20 (Section: 20.1-20.2)
2	Chapter 21 (Section: 21.1-21.7, 21.9 (model I&III))
3	Chapter 25 (Section: 25.1-25.8)
4	Chapter 12 (Section: 12.1-12.6)
5	Chapter 18 (Section: 18.1-18.2)

Reference Book

Operations Research by J.K. Sharma, Mac Millan publishers, New Delhi.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05DS6C

05DS6C	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	9	9	3	9
CLO2	9	-	3	9	9	3	9
CLO3	9	-	3	9	9	3	9
CLO4	9	-	3	9	9	3	9
CLO5	9	-	3	9	9	3	9
Weightage of the course	45	-	15	45	45	15	45
Weighted percentage of Course contribution to PLOs	3	0	2	5	5	4	4

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05DS6C

05DS6C	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	9
CLO2	3	9	9	3	9
CLO3	3	9	9	3	9
CLO4	3	9	9	3	9
CLO5	3	9	9	3	9
Weightage of the course	15	45	45	15	45
Weighted percentage of Course contribution to PSOs	2	4	4	3	5

Online Resources

Inventory Control:https://youtu.be/PuhgTVN_E_I ,
https://www.slideshare.net/ganapathyramasamy94/inventory-control-119164834
Queuing Theory:https://youtu.be/Yo7LG_JeJos
https://youtu.be/B_xYQWHOwQk
https://www.slideshare.net/avtarsingh/queuing-theory-2129896

Network Scheduling CPM/PERT https://youtu.be/ljtGERVLF5U , https://youtu.be/sqxpd8PjwQ0 https://www.slideshare.net/jyots_mamtani/pert-cpm-12632942https://youtu.be/J1WwNKDdDC0 https://youtu.be/WrAf6zdteXI
Sequencing Problems: https://youtu.be/EwcjyxuwUkIhttps://www.slideshare.net/abubashars/sequencing-problems, https://youtu.be/qzUODlPEnxI
Replacement Problems: https://youtu.be/vKVkOpNDZ2s , https://youtu.be/g0cKRU1N-t0 , https://www.slideshare.net/JimsIndia/replacement-problem

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Discipline Specific Elective**		SEMESTER - **VI**
Course Title **: Fuzzy Sets**		
Course Code: **05DS6D**	Hours per week: 6	Credits: 5
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

This course is offered for the III B.Sc. Mathematics students to provide a strong foundation on the concepts in Fuzzy Sets.

Course Learning Outcomes (CO)

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

No.	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	explain the concept of fuzzy sets and crisp sets in brief	K2, K3
CLO 2	understand the operations and relations in fuzzy sets	K1
CLO 3	demonstrate the operations on fuzzy sets	K2
CLO 4	analyze the relationship among fuzzy measures	K3
CLO 5	apply fuzzy theory in Engineering, Management and Medicine	K3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Crisp Sets and Fuzzy Sets: Introduction – Crisp Sets: An Overview – The Notion of Fuzzy Sets – Basic Concepts of Fuzzy Sets - Classical Logic: An Overview – Fuzzy Logic.	**(18Hrs)**
UNIT-II	Operations on Fuzzy Sets: General Discussion – Fuzzy Complement – Fuzzy Union – Fuzzy Intersection.	**(18Hrs)**
UNIT- III	Fuzzy Relations: Crisp and Fuzzy Relations – Binary Relations – Binary Relations on a Single Set – Equivalence and Similarity Relations – Compatibility or Tolerance Relations – Orderings.	**(18Hrs)**
UNIT- IV	Fuzzy Measures: General Discussion – Belief and Plausibility Measures – Probability Measures – Possibility and Necessity Measures – Relationship among Classes of Fuzzy Measures.	**(18Hrs)**
UNIT- V	Applications: Engineering - Medicine – Management and Decision Making.	**(18Hrs)**

Text Book

George J. Klir and Tina A. Folger, 2012. Fuzzy Sets, Uncertainty and Information, PHI Learning Private Limited, New Delhi – 110001.

Unit	Chapters
I	Chapter 1(1.1– 1.6)
II	Chapter 2(2.1– 2.4)
III	Chapter 3(3.1– 3.6)
IV	Chapter 4(4.1– 4.5)
V	Chapter 6(6.3 – 6.5)

Reference Books

1. George J. Klir and Bo Yuan. 2012, Fuzzy Sets and Fuzzy Logic Theory and Applications, Prentice-Hall of India.
2. Ganesh, M. 2015, Introduction to Fuzzy Sets and Fuzzy Logic, Prentice-Hall of India.
3. Zimmermann, H.J. 1996, Fuzzy Set Theory and its Applications, Allied Publishers Ltd., Chennai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05DS6D

05DS6D	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	3	3	-	3	-	3
CLO2	9	3	3	-	3	-	3
CLO3	9	3	3	-	3	-	3
CLO4	9	3	3	-	3	-	3
CLO5	9	3	3	-	3	-	3
Weightage of the course	45	15	15	0	15	0	15
Weighted percentage of Course contribution to PLOs	3	3	2	0	2	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05DS6D

05DS6D	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	9	9	9	3	3
CLO3	9	9	9	3	3
CLO4	9	9	9	3	3
CLO5	9	9	9	3	3
Weightage of the course	45	45	45	15	15
Weighted percentage of Course contribution to PSOs	6	4	4	3	2

Online Resources

Fuzzy set: https://youtu.be/IZWTduVCrf8, https://youtu.be/oWqXwCEfY78
https://www.slideshare.net/guptaprashant1986/fuzzy-setshttps://www.slideshare.net/AMITKUMAR4132/fuzzy-set-theory
Fuzzy Logic: https://youtu.be/LUz-FbwPh3Q, https://www.slideshare.net/appat/fuzzy-logic-10819010, https://www.slideshare.net/RituBafna/fuzzy-logic-ppt-8671225
Applications: https://youtu.be/aVsPJYxyq04, https://youtu.be/Nz9fpLxEtBE
https://youtu.be/K7S3TgfqnX0, https://www.slideshare.net/tarekgroup/fuzzy-logic-and-its-applications-191783026https://www.slideshare.net/IldarNurgaliev/fuzzy-logic-44984554y

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Skill Enhancement Course**		SEMESTER - **VI**
Course Title **: VEDIC MATHEMATICS**		
Course Code: **05SE61**	Hours per week: 2	Credits: 2
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To develop the skill of solving problems through Vedic Mathematics methods.

Syllabus

Unit – I	History of Vedic Mathematics, Salient features, Multiplication – Base Method like 10, 100, 1000…(Nikilam Sutram)
Unit – II	Multiplication (Urdhavtrighbhyam sutram) – 2 digits, 3 digits & 4 digits numbers
Unit – III	Square of any number – Base method like 10, 100, 1000 and so on.
Unit – IV	Square of any number – End with 5, Start with 5 & Dwandvayoga sutram
Unit – V	Cubes of any number – Anurupeyana sutram

Text Book

Dr.V.S.Narasimman, Sri C.Mayilvahanan, "Vedic Mathematics", Volume – 1 & 2, published by Vijaya bharatham publication, Chennai

Unit	Volume	Chapters
1	1	Chapter 1, 5 (5.2)
2		Chapter 5 (5.1)
3	2	Chapter 2 (2.2)
4		Chapter 2 (2.3, 2.4 & 2.1)
5		Chapter 4 (4.1)

Reference Book

Sri Bharatikrishna Tirthaji, "Vedic Mathematics", Published by Motilal Banarsidass, 1965. ISBN 81-208-0163-6.

Online Links

Unit – 1:
Unit – 2:
Unit – 3:
Unit – 4:
Unit – 5:

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Skill Enhancement Course**		SEMESTER - **VI**
Course Title **: QUANTITATIVE APTITUDE**		
Course Code: **05SE62**	Hours per week: 2	Credits: 2
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To develop the skills of solving problems in Competitive Exams.

Syllabus

Unit-I:

Time and work – time and distance

Unit –II:

Problems on trains

Unit – III:

Simple interest –compound interest

Unit – IV:

Logarithms – calendar

Unit – V:

Clocks – stocks and shares.

Text Books

Quantitative Aptitude for competitive examinations by Dr. R.S.Aggarwal, Tata MC. Graw Hill publication, New Delhi, Reprint 2011.

Units	Chapters
1	Chapter 15 & 17
2	Chapter 18
3	Chapter 21 & 22
4	Chapter 23 & 27
5	Chapter 28 & 29

Reference Books

1. Quickest Mathematics – Sh.S.N.Prasad – Kiran Prabakashan Pvt. Ltd., - edition 2013.
2. Quantitative Aptitude for the CAT – Nighit K.Sinha – Pearson India education Services Pvt. Ltd., - 2017

Online Resources

Unit I https://www.indiabix.com/aptitude/time-and-work/
https://youtu.be/KE7tQf9spPg https://www.indiabix.com/aptitude/time-and-distance/
https://youtu.be/ufbDCFUn6PY
Unit II https://www.indiabix.com/aptitude/problems-on-trains/, https://youtu.be/78b4Jn4rw44
Unit III https://www.indiabix.com/aptitude/simple-interest/
https://www.indiabix.com/aptitude/compound-interest/ https://youtu.be/B6u5n19LvEc
Unit IV https://www.indiabix.com/aptitude/logarithm/
https://www.indiabix.com/aptitude/calendar/ https://youtu.be/Ie5D8_q094U
https://youtu.be/fa0x2KkKPgk
Uint V https://www.indiabix.com/aptitude/clock/
https://www.indiabix.com/aptitude/stocks-and-shares/ https://youtu.be/vk59MdhU0XI
https://youtu.be/u_TL7euNAo4 https://youtu.be/aNZWcneFWyQ

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Skill Enhancement Course**		SEMESTER **– VI**
Course Title **: SPSS-Statistical package for the Social Sciences (Practical)**		
Course Code: **05SE63**	Hours per week: 2	Credits: 2
CIA: 40 Marks	ESE: 60 Marks	Total: 100 Marks

Syllabus

UNIT-I	Introduction of Data- Individual- Discrete and Continuous Frequency distribution - Bar Diagram- Histogram and Pie Diagram.
UNIT-II	Introduction – Measures of Central tendency : Mean, Median, Mode, Skewness and Kurtosis - Measures of Deviation- Standard Deviation and Coefficient of Variation
UNIT- III	Introduction - Correlation Coefficient - Regression Lines
UNIT- IV	Introduction –Small sample test : T test and F test – Large sample test: Z test and Non parametric test: Chi square test
UNIT- V	Introduction – One way Anova – Two Way Anova

Practical List:

1. Construct Discrete and Continuous Frequency Tables from raw data.
2. Construct Bar Diagram, Multiple Bar Diagram.
3. Construct Histogram and Pie Diagram.
4. Measure Mean, Median, Mode, Skewness and Kurtosis
5. Estimate Standard deviation and Coefficient of variation
6. Estimate Correlation Coefficient
7. Draw and find Regression Lines.
8. Test of Significance t test
9. Test of Significance F test
10. Test of Significance Z test
11. Test of Significance Non parametric test- Chi square test
12. Test of Significance of One way and Two way Anova

Text Book

Statistics by Dr. S. Arumugam and Prof. A. Thangapandi Isaac, New Gamma Publishing House, Palayamkottai. [Chapter 6,11,12,13,14 (14.1 – 14.3),15 & 16]

Reference Book

Mathematical Statistics by J.N. Kapur and H.S. Saxena, S.Chand & Company Pvt. Ltd, New Delhi.

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – IV **: Common Subject Theory**		SEMESTER - **VI**
Course Title **: Value Education**		
Course Code: **VEUG61**	Hours per week: 2	Credits: 2
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Syllabus

UNIT I: The heart of Education:

Introduction – Eternal Value – Integrated approach to value education - one for all and all for one – Responsibilities of a citizen – Habit Vs wisdom – purifying mind pollution – Respect for all Religions – Parents, teachers and fellow students – The need and benefit of exercise and meditation for students.

UNIT II: The Value of Body and Life Energy

Introduction – what are the causes for paid, Disease and death? Three Basic needs for all living Beings – Personal Hygiene Five Factors of Balance in Life – The need and benefits of physical Exercise – The value and Base of Life energy – The value and Base of Bio-magnetism - You are your own best caretaker. The Marvelous nature of mind Introduction- Bio-magnetism – The base of the mind – characterization of the Genetic Centre – metal frequency – practice for a creative mind - benefits of meditation.

UNIT III: Analysis of Thought

Introduction – An Exploitation on the nature of thought– six roots for thoughts – Introspection for analysis of thoughts-practical techniques for analysis of thoughts. Benefits of Blessings Effects of good vibrations – Make Blessing a Daily Habit.

UNIT IV: Moralization of Derive

Introduction – moralization of desire - Analyze your desires – Summary of practice Neutralization of Anger: Introduction – meaning – characteristics of Anger – Anger is a Destructive emotion – Anger spoils our relationship with others – Some common misconception about anger – will power and method success through awareness – method of neutralization of anger.

UNIT V: Eradication of Worries

Worry is a mental disease – Nature's Law of cause and effect – factors beyond our control – How to deal with problems – analyze your problem and eradicate worry –Harmonious Relationships Introduction – Three angles of life – The value of harmony in personal relations – Love and Compassion – pleasant face and loving words – appreciation and gratitude to parents and teachers – Bringing needed reforms in educational institutions – Why should we serve others? Brotherhood – A scientific Basis for Universal Brotherhood protection of the environment – non-violence and the fivefold moral culture.

Text Book

Value Education for Health, Happiness and Harmony(Based on the Philosophy and Teachings of Swami Vethanthiri Maharisi) Published By: Brain Trust, Aliyar - A Wing of World Community Service Centre.

Online Links

Unit – 1:
Unit – 2:
Unit – 3:
Unit – 4:
Unit – 5:

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – V **: Common Subject Theory**		SEMESTER **- VI**
Course Title **: Extension Activities**		
Course Code: **EAUG61**	Hours per week: --	Credits: 1
CIA : --	ESE : 100 Marks	Total : 100 Marks

Syllabus

UNIT-I: Community Development–I:

Definition – structure and composition – community based issues – need for awareness – Developmental Programmes.

UNIT – II: Community Development–II:

Rural Scenario – need of the Community – need for the community service – role of youth in community building – communal harmony – literacy – Educational Recreation.

UNIT – III: Volunteer Empowerment:

Women's Emancipation – formation of Youth Clubs – Self-Help Groups – Youth and Development.

UNIT – IV: Social Analysis:

Social issues – cultural invasion – media infiltration – human rights Education/Consumer Awareness – Adolescents Reproductive – HIV/AIDS/STD – Social harmony/National integration – Blood Donation.

UNIT – V: Introduction to NSS:

Basic Concepts – profile – aims – objectives – symbol – Motto – structure – Regular activities – Special Camping Programme – Adventure Programme – National Days and Celebrations.(Applicable to NSS Students)

(OR)

NCC - Origin – Organization – Ministry of Defense – Armed forces – commands – Defense establishments in Tamil Nadu Civil Defense – Aid to civil authorities – Disaster management – Leadership – Man management – Adventure activities – Social service

Reference

National Service Scheme Manual (Revised), Ministry of Human Resources Development, government of India.

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER - **III**
Course Title **: MATHEMATICS – I**		
Course Code: **05AE01**	Hours per week: 6	Credits: 4
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to acquire the basic knowledge in application of mathematics in differentiation and integration.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the expression of trigonometric functions and its hyperbolic functions.	K_1, K_2
CLO 2	acquire knowledge in solving problems in differential equations up to second order.	K_2, K_3
CLO 3	acquire knowledge in solving problems in integral equations up to triple integral.	K_2, K_3
CLO 4	understand the concepts involved in vector operators and its related problems.	K_2
CLO 5	acquire knowledge in vector integration on basic theorems and its related problems.	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	**Trigonometry** Expression for sin nθ, cos nθ & tan nθ - Expression for $\sin^n \theta$ and $\cos^n \theta$ - Expansion of Sinθ, Cosθ and Tanθ in powers of θ - Hyperbolic functions and inverse hyperbolic functions.	**(18 Hrs)**
UNIT-II	**Differential Calculus** Differentiation Methods - successive differentiation (up to second order derivative only, omit Leibritz theorem)	**(18 Hrs)**
UNIT- III	**Integral calculus** Properties of definite integrals – Reduction formula for $\int \sin^n x dx$, $\int \cos^n x dx$ and $\int \sin^m x \cos^n x dx$ only - Double and triple integrals (simple problems).	**(18 Hrs)**
UNIT- IV	**Vector Differentiation** Differentiation of vectors - Gradient of a vector -Directional derivative and its maximum value – Divergence and curl of a vector – solenoidal and irrotational vectors (Simple problems only).	**(18 Hrs)**
UNIT- V	**Vector Integration** Line and Surface Integrals - Green's theorem, Stoke's theorem and Gauss Divergence theorem (Statements only - without proof) - Verifications (simple problems).	**(18 Hrs)**

Text Books

1. Ancillary Mathematics Paper- I (MKU 2006-2007) by Dr. S. Arumugam & Issac Publisher: New Gamma Publishing House, Palayamkottai edition 2007.
2. Ancillary Mathematics Paper- II (Revised) by Dr. S. Arumugam & Issac Publisher: New Gamma Publishing House, Palayamkottai edition 2004.
3. Calculus by Dr. S. Arumugam & Issac Publisher: New Gamma Publishing House, Palayamkottai edition 2011.

Unit	Text Books	Chapters
1	1	Chapter 4
2	3	Chapter 2 (2.3-2.11)
3	1	Chapter 3 (3.1-3.3, 3.5, 3.6)
4	2	Chapter 1
5	2	Chapter 2

Reference Book

Ancillary Mathematics by T.K Manikavasagam Pillay & Others Viswanathan printers and publishers) Pvt. Ltd. Chennai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05AE01

05AE01	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	3	3	3	3
CLO2	9	-	3	3	3	3	3
CLO3	9	-	3	3	3	3	3
CLO4	9	-	3	3	3	3	3
CLO5	9	-	3	3	3	3	3
Weightage of the course	45	-	15	15	15	15	15
Weighted percentage of Course contribution to PLOs	3	0	2	2	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05AE01

05AE01	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	3	9	3	9
CLO2	9	3	9	3	9
CLO3	9	3	9	9	3
CLO4	9	9	3	9	3
CLO5	9	3	9	3	9
Weightage of the course	45	21	39	27	33
Weighted percentage of Course contribution to PSOs	6	2	4	5	4

Online Resources

Expansion of Trigonometry Ratio: https://youtu.be/6Rw-GMEjQ8shttps://youtu.be/giAjpfwC2LE
https://youtu.be/2VMiwNcg0ek
Inverse Trigonometry Ratio: https://youtu.be/YXWKpgmLgHk
https://youtu.be/w9sjzaXEGVw
https://youtu.be/ADpxUQMCSng

Hyperbolic function: https://youtu.be/PtKQKc629v8
Differential calculus: https://youtu.be/A6Ad7VnSlZE
https://youtu.be/UwmWTxAXMk4 , https://youtu.be/n2HDbExJWBU , https://youtu.be/om8OkTVrSbU
Integral calculus: https://youtu.be/iDSc2o-wE4I
Vector Integration: https://youtu.be/K37VbB5Ukxk
Vector differentiation: https://youtu.be/FfJtVvQtqTM
Gauss divergence theorem: https://youtu.be/kox4HHL43oM
Stock's Theorem: https://youtu.be/MZnymin9i3s
Green's Theorem: https://youtu.be/6fJE3vvjB8o

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER **- IV**
Course Title **: MATHEMATICS – II**		
Course Code:**05AE02**	Hours per week: 3	Credits: 3
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to acquire the basic knowledge in solving differential equations and its applications.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the formation of differential equations and its different forms.	K_1, K_2
CLO 2	acquire knowledge in solving problems in differential equations of first order.	K_2, K_3
CLO 3	acquire knowledge in solving problems in differential equations of higher order.	K_2, K_3
CLO 4	understand the concepts involved in differential equations of homogeneous forms.	K_2, K_3
CLO 5	acquire knowledge in solving problems in simultaneous differential equations and total differential equations.	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Formation of differential equation – Differential equation of first order and first Degree – variables separable, Homogeneous equations - Nonhomogeneous equations of first degree.	**(9 Hrs)**
UNIT-II	Exact differential equations – Integrating Factors – Methods of finding Integrating Factors (Theorems without proof) - Linear equations – Bernouilli's equations.	**(9 Hrs)**
UNIT- III	Linear equations of higher order - Second order differential equation with constant coefficients – Methods of finding complementary function - Methods of finding particular integrals for the type e^{ax}, cos ax, sin ax, x^m, $e^{ax}V$.	**(9 Hrs)**
UNIT- IV	Homogenous linear equation with variable coefficients – Method of Solving a linear equation with variable coefficients by variation of parameters.	**(9 Hrs)**
UNIT- V	Simultaneous linear differential equations – Total differential equations.	**(9Hrs)**

Text Book

Differential equations and Applications by Dr.S. Arumugam & Issac. Publisher: New Gamma Publishing House, Palayamkottai – 2011 edition.

Unit	Chapters
1	Chapter 1 (1.1 – 1.2)
2	Chapter 1 (1.3 – 1.6)
3	Chapter 2 (2.1 – 2.3)
4	Chapter 2 (2.4 – 2.5)
5	Chapter 2 (2.6 – 2.7)

Reference Book

Ancillary Mathematics by T.K Manikavasagam Pillay & Others Viswanathan printers and publishers) Pvt Ltd. Chennai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05AE02

05AE02	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	3	9	3	3	3
CLO2	9	-	3	9	3	3	3
CLO3	9	-	3	9	3	3	3
CLO4	9	-	3	9	3	3	3
CLO5	9	-	3	9	3	3	3
Weightage of the course	45	-	15	45	15	15	15
Weighted percentage of Course contribution to PLOs	3	0	2	5	2	4	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05AE02

05AE02	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	9	9	9	3	3
CLO2	3	3	3	3	3
CLO3	9	3	3	3	9
CLO4	9	3	3	3	3
CLO5	9	3	3	3	3
Weightage of the course	39	21	21	15	21
Weighted percentage of Course contribution to PSOs	5	2	2	3	2

Online Resources

1. https://www.youtube.com/watch?v=BxUrBQm8IC0 – Introduction of first order linear differential equations
2. https://www.youtube.com/watch?v=GSmCiYbX2xM – Exact D.E
3. https://www.youtube.com/watch?v=hNCE3AxbWj0 – Bernoulli's Equation
4. https://www.youtube.com/watch?v=UFWAu8Ptth0 – Second order LDE
5. https://www.youtube.com/watch?v=yTDx0Rzviak – Second order LDE with variable coefficients

DEPARTMENT OF MATHEMATICS

Programme: B.Sc. MATHEMATICS **(**Under CBCS and LOCF)

(For those students admitted during the Academic Year 2021 - 22 and after)

PART – III **: Ability Enhancement Course**		SEMESTER **- IV**
Course Title **: MATHEMATICS – III**		
Course Code: **05AE03**	Hours per week: 3	Credits: 3
CIA: 25 Marks	ESE: 75 Marks	Total: 100 Marks

Preamble

To enable the students to acquire the basic knowledge in partial differentiation and its applications.

Course Learning Outcomes (CLO)

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

No.	Course Learning Outcome	Knowledge Level (according to Bloom's Taxonomy)
CLO 1	understand the partial differential equations and solving its first order problems.	K_1, K_2
CLO 2	acquire knowledge in solving problems in different types of partial differential equations.	K_2, K_3
CLO 3	acquire knowledge in Laplace transforms and its applications.	K_2, K_3
CLO 4	acquire knowledge in Inverse Laplace transforms and its applications.	K_2, K_3
CLO 5	acquire knowledge in Fourier series, Odd and Even functions and its related problems.	K_2, K_3

K1-Remebering **K_2-Understanding** **K_3-Applying**

Syllabus

UNIT-I	Partial differential equations –formation– by elimination of arbitrary constants and arbitrary functions – first order partial differential equations – classification of integrals – solving first order p.d.e in Lagrange's form.	**(9 Hrs)**
UNIT-II	Solving p.d.e of some standard forms – Type I: $f(p,q) = 0$ – Type II: $z = px + qy + f(p,q)$ – Type III: $f(z,p,q) = 0$ - Type IV: $f_1(x,p) = f_2(y,q)$.	**(9 Hrs)**
UNIT- III	Laplace Transform: definition – Laplace transforms of $x^n, e^{ax}, \cos ax, \sin ax, \cosh ax \sinh ax$ finding Laplace transforms of $f'(x),\ f(ax), xf(x)$ and $\frac{f(x)}{x}$	**(9 Hrs)**
UNIT- IV	Inverse Laplace Transforms – solution of differential equations using Laplace Transform- linear equations with constant coefficients and variable coefficients – simultaneous equations.	**(9 Hrs)**
UNIT- V	Fourier series – Fourier series for odd and even functions - half range Fourier cosine and sine series – Fourier series in a general interval.	**(9 Hrs)**

Text Books

1. Differential Equations and applications by Dr.S. Arumugam & Issac Publisher: New Gamma Publishing House, Palayamkottai (Reprint 2011).
2. Ancillary Mathematics (Paper III-MKU) by Dr.S. Arumugam & Issac. Publisher: New Gamma Publishing House, Palayamkottai (2004 Edition).

Unit	Text Books	Chapters
1	1	Chapter 4 (Section: 4.1-4.3)
2		Chapter 4 (Section: 4.4)
3		Chapter 3 (Section: 3.1)
4		Chapter 3 (Section: 3.2)
5	2	Chapter 9

Reference Book

Ancillary Mathematics by T.K Manikavasagam Pillay & Others Viswanathan printers and publishers) Pvt. Ltd. Chennai.

Mapping of CLO with PLO

CLO – PLO Mapping for Course Code: 05AE03

05AE03	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	9	-	-	-	-	-	3
CLO2	9	-	-	-	-	-	3
CLO3	9	-	-	-	-	-	3
CLO4	9	-	-	-	-	-	3
CLO5	9	-	-	-	-	-	3
Weightage of the course	45	-	-	-	-	-	15
Weighted percentage of Course contribution to PLOs	3	0	0	0	0	0	1

Mapping of CLO with PSO

CLO – PSO Mapping for Course Code: 05AE03

05AE03	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	3	9	9	3	3
CLO2	3	9	9	3	3
CLO3	3	9	9	3	3
CLO4	3	9	9	3	3
CLO5	3	9	9	3	3
Weightage of the course	15	45	45	15	15
Weighted percentage of Course contribution to PSOs	2	4	4	3	2

Online Resources

PDE: https://youtu.be/u4yBWpmB6z4 https://youtu.be/OCLw11a0LTM
Lagrange's form: https://youtu.be/41U-i1Q7se0 https://youtu.be/QLLOI382tZw
Types of PDE: https://youtu.be/ongICvz1BsQ https://youtu.be/vSdrKPNIIRE
Laplace Transform: https://youtu.be/luJMl37-nso https://youtu.be/EDVJotmT584
Inverse Laplace transform: https://youtu.be/_P519nGupO8 https://youtu.be/HuHgbEuUBSo
Fourier Transform: https://youtu.be/-E_WkcdszKU https://youtu.be/GtXmS5YH7XM
https://youtu.be/lkAvgVUvYvY