AVS

COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS)

Attur Main Road, Ramalingapuram, Salem - 106.

(Recognized under section 2(f) & 12(B) of UGC Act 1956 and

Accredited by NAAC with 'A' Grade)

(Co - Educational Institution | Affiliated to Periyar University, Salem

ISO 9001 : 2015 Certified Institution)

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Syllabus for

B. Sc MATHEMATICS

CHOICE BASED CREDIT SYSTEM –

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK

(CBCS – LOCF)

(Applicable to the Candidates admitted from 2023-24 onwards)

VISION

- To attain excellence in the field of education by creating competent scholars with a touch of human values.

MISSION

- To accomplish eminence in the academic domain.
- To provide updated infrastructure.
- To educate value based education.
- To impart skills through efficient training programs.
- To cultivate culture and tradition with discipline and determination.

REGULATIONS

1. Eligibility for Admission:

A Pass in the Higher Secondary Examination of Tamil Nadu Higher Secondary Board or some other Board accepted by the Syndicate as equivalent thereto with Mathematics (other than Business mathematics) as One of the subjects.

2. Duration:

The candidates shall complete all the courses of the programme within 5 years from the date of admission.

The programme of study shall consist of six semesters and a total period of three years with 140 credits.

The programme of study will comprise the course according to the syllabus.

3. Eligibility for award of degree:

No candidate shall be eligible for conferment of the Degree unless he / she

i) Has undergone the prescribed course of study for a period of not less than six semesters in an institution approved by/affiliated to the University or has been exempted from in the manner prescribed and has passed the examinations as have been prescribed the refer.

ii) Has completed all the components prescribed under Parts I to Part V in the CBCS pattern to earn 140 credits.

iii) Has successfully completed the prescribed Field Work/ Institutional Training as evidenced by certificate issued by the Principal of the College.

4. Course of Study:

Program means a course of study leading to the award of the degree in a discipline.

Course refers to the subject offered under the degree programme.

5. Scheme of Examination:

The course of study shall be based on semester pattern with Internal Assessment under Choice Based Credit System.

The examinations for all the papers consist of both Internal (Continuous Internal Assessment CIA) and External (end semester) theory examination.

The theory examination shall be conducted for three hours duration at the end of each semester

The candidates failing in any subjects(s) will be permitted to appear for the same in the subsequent semester examinations.

6. Passing Rules:

The Candidates shall be declared to have passed the examination if he/she

i) Theory

Secures not less than 40 marks in total (CIA mark + Theory Exam mark) with minimum of 30 marks in the

Theory Exam conducted by the University.

ii) Practical

Secures not less than 40 marks in total (CIA mark + Practical Exam mark) with minimum of 18 marks out of 45 marks in the Practical Exam conducted by the University.

Programme Outcomes (POs) On successful completion of the B. Sc Mathematics	
PO1	Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
PO2	Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO3	Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.
PO4	Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.
PO5	Scientific Reasoning: Ability to analyze, interpret and draw conclusions from quantitative / qualitativedata; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO6	Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self- directed learning aimed at personal development, meeting economic, social and cultural objectives.

Program Specific Outcomes (PSOs) After the successful completion of B. Sc Mathematics programme the students are expected to	
PSO1	Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.
PSO2	Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.
PSO3	To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

Programme Educational Objectives (PEOs)	
The B. Sc Mathematics programme describes accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	The graduates will be well prepared for successful careers at Local, National and International level, and can work as analyst, quality controller, research assistant at various organizations.
PEO2	The graduates will provide leadership and lifelong learning qualities required for a successful professional career along with ethical attitude and teamwork skills.
PEO3	The graduates will be able to formulate, investigate and analyze scientifically real life problems along with ethical attitude.
PEO4	The graduates will engage in professional activities to enhance their own stature and simultaneously contribute to the profession and the society at large.
PEO5	The graduates will be successful in higher education in sciences and in management, if pursued.

CREDIT DISTRIBUTION FOR 3 YEARS B. Sc MATHEMATICS PROGRAMME

Part	Course Type	Credits per Course	No. of Papers	Total Credits
Part I	Language – I (Tamil/Hindi/French)	3	4	12
Part II	Language – II (English)	3	4	12
Part III	Core Courses- Theory	4	15	60
	Core Courses- Practical			
	Major Elective Courses- Theory	3	4	12
	Major Elective Courses- Practical	1	1	1
	Generic Discipline Specific/ Allied Courses - Theory	4	4	16
	Generic Discipline Specific/ Allied Courses - Practical	1	2	2
	Generic Discipline Specific/ Allied Courses - Practical	2	1	2
			Total	**117**
Part IV	Non Major Elective Courses	2	2	4
	Skill Enhancement Courses	2	3	6
	Skill Enhancement Courses	1	1	1
	Skill Enhancement Courses (Practical)	2	1	2
	Professional Competency Skill Enhancement Course	2	1	2
	Foundation course	2	1	2
	EVS (Environmental Studies)	-	-	-
	Value Education	2	1	2
	Internship	2	1	2
	Field Project	-	-	-
	MOOC/ SWAYAM/ NPTEL Courses	2	1	2
			Total	**23**
Part V	Extension Activity (NSS/NCC/Physical Education)	1	1	1
Part VI	Naan Mudhalvan Scheme (Online Examination &Project work)	-	-	-
			Total Credits	**141**

CONSOLIDATED SEMESTER WISE AND COMPONENT WISE CREDIT DISTRIBUTION FOR 3 YEARS B. Sc MATHEMATICS PROGRAMME

Parts	Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI	Total Credits
Part I	**3**	**3**	**3**	**3**	**-**	**-**	**12**
Part II	**3**	**3**	**3**	**3**	**-**	**-**	**12**
Part III	**14**	**13**	**13**	**13**	**22**	**18**	**93**
Part IV	**4**	**4**	**3**	**6**	**4**	**3**	**24**
Part V	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total	**24**	**23**	**22**	**25**	**26**	**21**	**141**

*Part I, II and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programmes and the other components IV and V have to completed during the duration of the programmes as per the norms, to be eligible for obtaining the UG degree.

METHOD OF EVALUATION

Evaluation	Components		Marks
Internal Evaluation	Continuous Internal Assessment Test	15	25 Marks
	Assignments	3	
	Class Participation	2	
	Distribution of marks for Attendance (in percentage) 96 – 100: 5 Marks 91 – 95: 4 Marks 86 – 90: 3 Marks 81 – 85: 2 Marks	5	
External Evaluation	End Semester Examination		75 Marks
Total			**100 Marks**

Note: 1.UG Programmes- A candidate must score minimum 10 marks in Internal and 30 marks in External Evaluation.

2. PG Programmes- A candidate must score minimum 13 marks in Internal and 38 marks in External Evaluation.

CONTINUOUS INTERNAL ASSESSMENT

Categorizing Outcome Assessment Levels Using Bloom's Taxonomy

level	Cognitive Domain	Description
K1	Remember	It is the ability to remember the previously learned concepts or ideas.
K2	Understand	The learner explains concepts or ideas.
K3	Apply	The learner uses existing knowledge in new contexts.
K4	Analyze	The learner is expected to draw relations among ideas and to compare and contrast.
K5	Evaluate	The learner makes judgements based on sound analysis.
K6	Create	The learner creates something unique or original.

Question Paper Blue Print for Continuous Internal Assessment- I & II

Duration: 2 Hours							Maximum: 50 marks
Section	K level						Marks
	K1	K2	K3	K4	K5	K6	
A (no choice)	10						10 X 1 =10
B (no choice)		1	1				2 X 5 =10
C (either or choice)				3			3 x 10 = 30
Total							50 marks

Note: K4 and K5 levels will be assessed in the Model Examination whereas K5 and K6 Levels will be assessed in the End Semester Examinations.

Question Paper Blue Print for Continuous Internal Assessment- I

Time: 2 Hours Total Marks: 50 Marks Minimum Pass: 20 Marks

Unit	Section - A	Section - B	Section - C
I	Q.N. 1, 2, 3, 4, 5	Q.N. 11	Q.N. 13 A, 13 B
I or II	-	-	Q.N. 14 A, 14 B
II	Q.N. 6, 7, 8, 9, 10	Q.N. 12	Q.N. 15 A, 15 B

SECTION – A (10 X 1 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – C (3 X 10 = 30 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Continuous Internal Assessment- II

Time: 2 Hours Total Marks: 50 Marks Minimum Pass: 20 Marks

Unit	Section - A	Section - B	Section - C
III	Q.N. 1, 2, 3, 4, 5	Q.N. 11	Q.N. 13 A, 13 B
III or IV	-	-	Q.N. 14 A, 14 B
IV	Q.N. 6, 7, 8, 9, 10	Q.N. 12	Q.N. 15 A, 15 B

SECTION – A (10 X 1 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – C (3 X 10 = 30 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Model Examination & End Semester Examination

Duration: 3 Hours								Maximum: 75 marks
Section		K level						Marks
		K1	K2	K3	K4	K5	K6	
A (no choice, three questions from each unit)		15						15 X 1 =15
B (choice, one question from each unit)			1	1				2 X 5 =10
C (either or choice& two questions from each unit)	*Courses with K4 as the highest cognitive level*				4	1		5 x 10 = 50
	Course with K5 as the highest cognitive level wherein three K4 questions and two K5 questions are compulsory.				3	2		
	Course with K6 as the highest cognitive level wherein two questions each on K4, K5 and one question on K6 are compulsory.				2	2	1	
Total								75 marks

Question Paper Blue Print for Model Examination & End Semester Examination

Time: 2 Hours Total Marks: 75 Marks Minimum Pass: 30 Marks

Unit	Section - A	Section - B	Section - C
I	Q.N. 1, 2, 3	Q.N. 16	Q.N. 21 A, 21 B
II	Q.N. 4, 5, 6	Q.N. 17	Q.N. 22 A, 22 B
III	Q.N. 7, 8, 9	Q.N. 18	Q.N. 23 A, 23 B
IV	Q.N. 10, 11, 12	Q.N. 19	Q.N. 24 A, 24 B
V	Q.N. 13, 14, 15	Q.N. 20	Q.N. 25 A, 25 B

SECTION – A (15 X 1 = 15 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ANY TWO QUESTIONS

SECTION – C (5 X 10 = 50 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Model Practical Examination & End Semester Examination (Practical)

Time: 3 Hours Total Marks: 60 Marks Minimum Pass: 24 Marks

Practical Marks	Maximum Mark	Minimum Mark
Internal	40	16
External	60	24
Total	100	40

Evaluation for End Semester Examinations (Practical)

Record	10 marks
Formula with expansion	05 marks
Observation with data	20 marks
Viva-voce	05 marks
Calculation	15 marks
Result with units	05 marks
TOTAL	**60 MARKS**

*Submission of record with due certification is a must for external practical examinations.

**A student should complete all requires experiments to get 10 marks for the record.

Scheme of Examination for B. Sc Mathematics

First Year – Semester - I

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA01	Podhu Tamil - I	4	3	25	75	100
II	23UFEN01	General English - I	4	3	25	75	100
III	23UMACT01	Core I - Algebra &Trigonometry	4	4	25	75	100
III	23UMACT02	Core II - Differential Calculus	4	4	25	75	100
III	23UPHA01	Elective Course - I Allied Physics-I	4	4	25	75	100
III	23UPHAP01	Allied Physics Practical - I	2	2	40	60	100
IV	23UMAFC01	Foundation Course - Bridge Mathematics	2	2	25	75	100
IV	23UTANE01	Non Major Elective Course – Pechukalai Thiran	1	2	25	75	100
Total			**25**	**24**			

First Year – Semester - II

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA02	Podhu Tamil - II	4	3	25	75	100
II	23UFEN02	General English - II	4	3	25	75	100
III	23UMACT03	Core III - Analytical Geometry (Two & Three Dimensions)	4	4	25	75	100
III	23UMACT04	Core IV- Integral Calculus	4	4	25	75	100
III	23UPHA02	Elective Course II - Allied Physics - II	4	3	25	75	100
III	23UPHAP02	Allied Physics Practical - II	2	2	40	60	100
IV	23UMASE03	Skill Enhancement Course - III Computational Mathematics	2	2	25	75	100
IV	23UBXNE002	Non Major Elective Course – Managerial Skill Development	1	2	25	75	100
Total			**25**	**23**			

Second Year – Semester - III

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA03	Podhu Tamil - III	4	3	25	75	100
II	23UFEN03	General English - III	4	3	25	75	100
III	23UMACT05	Core V- Vector Calculus and its Applications	5	4	25	75	100
III	23UMACT06	Core VI - Differential Equations and its Applications	4	4	25	75	100
III	23USTAT01	Elective Course III - Allied - Statistical Methods – I	4	5	25	75	100
IV	23UMASE04	Skill Enhancement Course IV - Statistics with Excel Programming	1	1	25	75	100
IV	23UMASE05	Skill Enhancement Course V - Mathematics For Competitive Examinations - III	2	2	25	75	100
IV		Environmental Studies	1	-	25	75	100
Total			**25**	**22**			

Second Year – Semester - IV

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA04	Podhu Tamil - IV	4	3	25	75	100
II	23UFEN04	General English - IV	4	3	25	75	100
III	23UMACT07	Core VII - Industrial Statistics	3	4	25	75	100
III	23UMACT08	Core VIII - Elements of Mathematical Analysis	4	4	25	75	100
III	23USTAT02	Elective Course IV - Allied - Statistical Methods – II	3	3	25	75	100
III	23USTAP01	Allied – Statistics Practical	2	2	40	60	100
IV	23UMASE06	Skill Enhancement Course VI - Mathematics For Competitive Examinations - IV	2	2	25	75	100
IV	23UMASE07	Skill Enhancement Course - VII LaTeX Practical	2	2	25	75	100
IV		Environmental Studies	1	2	25	75	100
Total			**25**	**25**			

Third Year – Semester -V

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
III	23UMACT09	Core IX - Abstract Algebra	4	4	25	75	100
III	23UMACT10	Core X - Real Analysis	4	4	25	75	100
III	23UMACT11	Core XI - Mathematical Modeling	4	4	25	75	100
III	23UMACT12	Core XII - Optimization Techniques	4	4	25	75	100
III	23UMAME01	Elective Course – V (From Group-I) Numerical Methods with Application	4	3	25	75	100
III	23UMAME05	Elective Course – VI (From Group-II) Discrete Mathematics	4	3	25	75	100
IV		Value Education Yoga	1	2	25	75	100
IV		Internship / Industrial Training (Summer vacation at the end of IV semester activity)	-	2	25	75	100
Total			**25**	**26**			

Third Year – Semester -VI

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
III	23UMACT13	Core XIII - Linear Algebra	5	4	25	75	100
III	23UMACT14	Core XIV - Complex Analysis	5	4	25	75	100
III	23UMACT15	Core XV - Mechanics	5	4	25	75	100
III	23UMAME02	Elective Course – VII (From Group-I) Number Theory	4	3	25	75	100
III	23UMAME06	Elective Course – VIII (From Group-II) Graph Theory with Application	4	3	25	75	100
IV	23UMAPC01	Professional Competency Skill - Statistics with R Programming	2	2	25	75	100
IV		Extension Activity	-	1	25	75	100
Total			**25**	**21**			

****Ins. Hrs** – Instructional Hours**, CIA-** Continuous Internal Assessment**, ESE-** End Semester Examination

Semester: I	Course Code: 23UMAFC01	Hours/Week: 2	Credit: 2
COURSE TITLE : FOUNDATION COURSE - BRIDGE MATHEMATICS			

Course Overview:

1. The objective of the course was to provide adequate foundation in Mathematics which is a prerequisite for learning Mathematics in higher education and to bridge the gap between Math learnt in schools and the Math to be learnt in college.

Learning Objectives:

1. To bridge the gap and facilitate transition from higher secondary totertiary education;
2. To instill confidence among stakeholders and inculcate interest for Mathematics;

Unit - I	Algebra	09 Hours

Binomial theorem, General term, middle term,problems based on these concepts NCERT -(11^{th} standard)[Chapter -8, Page No: 160-176]

Unit - II	Sequences and series (Progressions)	09 Hours

Fundamental principle of counting. Factorial n. NCERT -(11^{th} standard)[Chapter -9 , PageNo: 177-196]

Unit - III	Permutations and combinations	09 Hours

Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.Volume I (11^{th} standard) [Chapter -4, Sec. 4.4-4.5 Page No:167-186]

Unit - IV	Trigonometry	09 Hours

Trigonometry: Introduction to trigonometric ratios, proof of sin(A+B), cos(A+B), tan(A+B) formulae, multiple and sub multiple angles, sin(2A), cos(2A), tan(2A) etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule

Volume I (11^{th} standard)

[Chapter -3, Sec. 3.5, 3.5.2, 3.5.3 Page No: 104-122]

[Chapter -3, Sec. 3.7.1-3.7.2 Page No: 134-137]

Inverse trigonometric functions, sine rule and cosine rule Volume I (12^{th} standard) [Chapter -4, Page No: 132-142]

Unit - V	Calculus	09 Hours

Calculus: Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product ruleand substitution method.

Volume II (11^{th} standard)

[Chapter -9, Sec. 9.2.1, 9.2.10 Page No: 88-103]

[Chapter -10, Sec. 10.2.3 Page No: 114-118]

[Chapter -11, Sec. 11.7 Page No: 196-209]

Text Book(s):

1. NCERT class XI text books. First edition February 2006 ,reprint 2019. Unit I & II.
2. State Board Mathematics text books of class XI, Volume – 1 .Revised edition 2019 , 2020. UNIT III,
3. State Board Mathematics text books of class XI , volume -1 revised edition 2019, 2020 and class XII volume- 1 revised edition2020, 2022 UNIT IV,
4. State Board Mathematics text books of class XI , volume -2revised edition 2019 , UNIT V.

Reference Books:

1. State Board Mathematics text books of class XI , volume -1 revised edition 2019, 2020 and class XII volume- 1 revised edition2020, 2022

Web Resources:

1. https://nptel.ac.in

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	Prove the binomial theorem and apply it to find the expansions of any (x + y)n and also, solve the related problems.	K1
CO2	Find the various sequences and series and solve the problems related to them. Explain the principle of counting.	K2
CO3	Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations.	K3
CO4	Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations.	K4
CO5	Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)								
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	L	L	L	L	L	L	L	M
CO2	M	L	L	M	M	L	L	L
CO3	M	L	L	M	M	L	M	L
CO4	L	L	L	L	L	L	M	L
CO5	L	L	L	L	L	L	M	L

S - Strong, M – Medium, L – Low

Semester: I	Course Code: 23UMACT01	Hours/Week: 4	Credit: 4
COURSE TITLE : CORE I - ALGEBRA & TRIGONOMETRY			

Course Overview:

1. This course covers the essentials of functions (linear, quadratic, polynomial, logarithmic, exponential, and trigonometric), graphing, solving equations and inequalities, systems of equations, and sequences and series.

Learning Objectives:

1. Basic ideas on the Theory of Equations, Matrices and Number Theory.
2. Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.

Unit - I	Reciprocal Equations	09 Hours

Reciprocal Equations-Standard form – Increasing or decreasing the roots of a given equation-Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems. (Book1 – Chapter6: Sections 16, 17, 19, 30).

Unit - II	Summation of Series	09 Hours

Summation of Series: Binomial– Exponential – Logarithmic series (Theorems without proof) – Approximations - related problems. (Book1 – Chapter3: Sections 10, 14; Chapter4: Sections -1, 2, 3, 5, 7, 8, 9.11).

Unit - III	Inverse of a square matrix up to order 3	09 Hours

Inverse of a square matrix up to order 3, Characteristicequation – Eigen values and Eigen Vectors - Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Diagonalization of square matrices - related problems. (Book2 – Chapter2: Sections -8,16).

Unit - IV	Expansions of sinnθ, cosnθ in powers of sinθ, cosθ	09 Hours

Expansions of sinnθ, cosnθ in powers of sinθ, cosθ - Expansion of tannθ in terms of tan θ, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta\sin^n\theta$ – Expansions of $\tan(\theta_1+\theta_2+,\ldots,+\theta_n)$ - Expansions of sinθ, cosθ and tanθ in terms of θ - related problems. (Book3 - Chapter3: Sections 1 to 5).

Unit - V	Hyperbolic functions	09 Hours

Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm ofcomplex quantities, Summation of trigonometric series - related problems. (Book3 - Chapter4; Chapter5; Chapter6: Sections 1, 3, 3.1 Related problems.)

Text Book(s):

1. Manickavasagam Pillai, T.K., T. Natarajan and Ganapathy KS – Algebra Vol-I, Viswanathan Publishers and Printers Pvt Ltd., - 2008.
2. Manickavasagam Pillai, T.K., T. Natarajan and Ganapathy KS – Algebra Vol-II, Viswanathan Publishers and Printers Pvt Ltd., - 2008.
3. Manichavasagam Pillai, T.K. and S. Narayanan, Trigonometry – Viswanathan Publishers and Printers Pvt. Ltd. 2013.

Reference Books:

1. W.S. Burnstine and A.W. Panton, Theory of equations

2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007

3. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005

4. C.V.Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003

Web Resources:

1. https://nptel.ac.in

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	**Statements**	**Bloom's Level**
CO1	Classify and Solve reciprocal equations	K1
CO2	Find the sum of binomial, exponential and logarithmic series	K2
CO3	Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix	K3
CO4	Expand the powers and multiples of trigonometric functions in terms of sine and cosine	K4
CO5	Determine relationship between circular and hyperbolic functions and the summation of trigonometric series	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	L	S	-	-	-	S	M	L
CO2	M	L	S	L	-	-	S	M	L
CO3	S	L	S	L	-	-	S	M	L
CO4	S	L	S	-	-	-	S	M	L
CO5	S	L	S	-	-	-	S	M	L

S - Strong, M – Medium, L – Low

Semester: I	**Course Code: 23UMACT02**	**Hours/Week: 4**	**Credit: 4**
COURSE TITLE : CORE II - DIFFERENTIAL CALCULUS			

Course Overview:

1. Differential Calculus courses aims to provide quality training for everyone—from individual learners seeking personal growth to corporate teams looking to up skill.
2. For those pursuing professional advancement, skill acquisition, or even a new career path, these Differential Calculus courses can be a valuable resource.

Learning Objectives:

1. Basic ideas on the Theory of Equations, Matrices and Number Theory. • The basic skills of differentiation, successive differentiation, and their applications.
2. Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.

Unit - I	**Successive Differentiation**	**09 Hours**

Introduction (Review of basic concepts) – The n^{th} derivative – Standard results Fractional expressions – Trigonometrically transformation – Formation of equations involving derivatives - Leibnitz formula for the n^{th} derivative of a product. (Chapter3: Sections 1.1 to 1.6 and 2.1, Related problems.)

Unit - II	Partial Differentiation	09 Hours

Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions. (Chapter8: Sections 1.1 to 1.5.)

Unit - III	Partial Differentiation (Continued)	09 Hours

Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers. (Chapter8: Sections 1.6, 1.7 and Sections 4, 5.)

Unit - IV	Envelope	09 Hours

Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter. (Chapter10: Sections 1.1 to 1.4.)

Unit - V	Curvature	09 Hours

Definition of Curvature – Circle, Radius and Centre of Curvature – Cartesian formula for the radius of curvature – The coordinates of the centre of curvature - Evolutes and Involutes – Radius of Curvature in Polar Co-ordinates. (Chapter10: Sections 2.1 to 2.6)

Text Book(s):

1. S. Narayanan and T.K. Manicavachagom Pillay, Calculus -Volume I,(2004), S. Viswananthan Printers Pvt. Ltd.

Reference Books:

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010.
3. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.

Web Resources:

1. https://onlinecourses.nptel.ac.in
2. https://www.mooc-list.com/tags/differential-calculus
3. https://onlinecourses.swayam2.ac.in/cec19_ma02/preview
4. https://www.khanacademy.org/math/differential-calculus

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Find the nth derivative, form equations involving derivatives and apply Leibnitz formula	K1
CO2	Find the partial derivative and total derivative coefficient	K2
CO3	Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers	K3
CO4	Find the envelope of a given family of curves	K4
CO5	Find the evolutes and involutes and to find the radius of curvature using polar co- ordinates	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	L	M	M	S	S	S	L	M	M
CO2	M	L	M	-	-	-	M	M	L
CO3	M	L	M	-	-	-	M	M	L
CO4	M	M	M	M	-	-	M	M	L
CO5	M	M	M	M	L	-	M	M	L

S - Strong, M – Medium, L – Low

Semester: I	Course Code: 23UMAAT01	Hours/Week: 5	Credit: 4
COURSE TITLE : ALLIED MATHEMATICS-I: ALGEBRA AND CALCULUS (FOR B. SC PHYSICS / B. SC CHEMISTRY)			

Course Overview:

1. This is a course covering the elementary methods necessary for mathematical modelling. Emphasis will be placed on developing facility, technique and use in applications.

Learning Objectives:

1. To learn the basic concepts and problem solving in Theory of equations.
2. Develop the ability of solving the Integrals.

Unit – I	Theory of Equations	09 Hours

Imaginary roots – Irrational roots – Formation of equations – Solutions of equations – Diminishing the roots of an equation & solutions – Removal of the second term of an equation & solutions – Descartes' rule of sign – Problems only. (Chapter6: Sections 4,9,10 & 11)

Unit – II	Matrices	09 Hours

Definition of Characteristic equation of a matrix – Characteristic roots of a matrix - Eigen values and the Corresponding Eigen vectors of matrix – Cayley Hamilton theorem (Statement only) – Verifications of Cayley Hamilton Theorem – Problems only. (Chapter 5)

Unit - III	Radius of Curvature	09 Hours

Formula of Radius of Curvature in Cartesian coordinates, Parametric coordinates and Polar coordinates (no proof for formulae) – Problems only. (Chapter11)

Unit - IV	Partial Differential Equations	09 Hours

Formation of Partial Differential Equations by eliminating the arbitrary constant and arbitrary functions – Lagrange's Linear Partial Differential Equations – Problems only. (Chapter26)

Unit – V	Integration	09 Hours

Definite Integral : Simple properties of definite Integrals(Chap -15) – Bernoulli's Formula – Integration by parts – Simple problems ; Reduction formula for ∫ □□□□□ □□ , ∫ □□□□□ □□ , ∫ □ $^{-□}$ □□ , ∫ □$^{□}$□ $^{□□}$ □□ simple problems. (Chapter16)

Text Book(s):

1. Dr. P.R. Vittal, Allied Mathematics , Margham publication, Chennai – 17, Reprint 2016

Reference Books:

1. S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011.
2. P. Kandasamy, K. Thilagavathy, Allied Mathematics Volume I, S. Chand publication, July 2012

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc21_ma16/preview
2. https://www.udemy.com/course/free-algebra-and-calculus-maths/

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Explain in detail about Imaginary roots, irrational roots and formation of equations and Descartes' rule of sign	K1
CO2	Explain Characteristic equation and roots of the matrix and Eigen values and Eigen vector of the matrix and Verification of Cayley Hamilton theorem.	K2
CO3	Explain Formula for Radius of curvature in Cartesian coordinates and Parametric coordinates and Polar coordinates.	K3
CO4	Explain Formation of Partial Differential Equations by eliminating the arbitrary constant and arbitrary functions	K4
CO5	Explain Simple properties of definite Integrals and Bernoulli's Formula and Integration by parts.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	M	S	-	-	-	S	M	M
CO2	M	L	S	L	-	-	S	M	L
CO3	S	L	S	L	-	-	S	M	L
CO4	S	L	S	-	-	-	S	M	L
CO5	S	L	S	-	-	-	S	M	L

S - Strong, M – Medium, L – Low

Semester: I	Course Code: 23UMAEGS05	Hours/Week: 5	Credit: 3
COURSE TITLE : INTRODUCTION TO LINEAR ALGEBRA (FOR ALL COMPUTER SCIENCE DEPARTMENTS)			

Course Overview:

1. It includes vectors, matrices and linear functions. It is the study of linear sets of equations and its transformation properties.

Learning Objectives:

1. Develop the ability of solving the Partial fraction, Binomial Series Exponential series and Logarithms Series
2. Acquire knowledge about Matrices and Cayley – Hamilton Theorem

Unit – I	Partial Fraction and Binomial Series	09 Hours

Partial Fraction - Resolution into partial fraction - Binomial theorem for a positive integral index - Binomial theorem for rational index Simple problems. Chapter-1 and 2

Unit – II	Exponential Series and Logarithms Series	09 Hours

Exponential series - Standard result for exponential series Logarithms Series - Simple problems. Chapter-3 and 4

Unit - III	Matrices	09 Hours

Introduction - Type of matrix - Matrix Operations - Transpose of a matrix - Determinant of a matrix - Inverse of a matrix - symmetric and skew symmetric - Conjugate of a matrix -Hermitian and skew Hermitian matrix - Simple problems Chapter-5 (Page No:5.1 to 5.17)

Unit - IV	Rank of a Matrix	09 Hours

Orthogonal and Unitary matrix – Rank of a matrix- Test tor consistency of linear equation - Condition for consistency Chapter-5 (Page No:5.18 to 5.49)

Unit – V	Cayley Hamilton Theorem	09 Hours

Definition of Characteristic equation of a matrix – Characteristic roots of a matrix - Eigen values and the Corresponding Eigen vectors of matrix – Cayley Hamilton theorem (Statement only) – Verifications of Cayley Hamilton Theorem – Problems only. (Chapter 5) (Page No:5.50- 5.74)

Text Book(s):

1. Dr. P.R. Vittal, Allied Mathematics, Margham publication, Chennai– 17, Reprint 2016.

Reference Books:

1. S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011.
2. P. Kandasamy, K. Thilagavathy, Allied Mathematics Volume I, S. Chand publication, July 2012

Web Resources:

1. https://www.mooc-list.com/tags/linear-algebra
2. https://onlinecourses.nptel.ac.in/noc22_ma45/preview

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Define Partial Fraction and Binomial Series and examples.	K1
CO2	Define Exponential Series and Logarithms Series and examples.	K2
CO3	Define matrix and simple problems.	K3
CO4	Define Rank of matrix and problems.	K4
CO5	Describe Cayley Hamiltan Theorem.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	S	M	S	S
CO3	S	S	M	S	S
CO4	M	S	M	M	S
CO5	M	S	M	S	S

S - Strong, M – Medium, L – Low

Semester: II	Course Code: 23UMACT03	Hours/Week: 4	Credit: 4
COURSE TITLE : CORE III - ANALYTICAL GEOMETRY (TWO & THREE DIMENSIONS)			

Course Overview:

1. This is a beginning course in plane analytic geometry emphasizing the correspondence between geometric curves and algebraic equations
2. This correspondence makes it possible to reformulate problems in geometry as equivalent problems in algebra, and vice versa.
3. Curves studied include straight lines, circles, parabolas, ellipses, and hyperbolas.
4. Coordinate transformations, polar coordinates, and parametric equations are also studied. The course assumes a sound background in algebra, geometry, and trigonometry.

Learning Objectives:

1. Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes.
2. To present mathematical arguments about geometric relationships
3. To solve real world problems on geometry and its applications.

Unit - I	Pole, Polar	09 Hours

Pole, Polar - conjugate points and conjugate lines – diameters – conjugate diameters of an ellipse - semi diameters - conjugatediameters of hyperbola. (Book1: Chapter9, 10)

Unit - II	Polar coordinates	09 Hours

Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola. (Book2: Chapter9)

Unit - III	System of Planes	09 Hours

System of Planes - Length of the perpendicular – Orthogonal projection. (Book3: Chapter2: Sections 2.5,2.7,2.9)

Unit - IV	Representation of line	09 Hours

Representation of line – angle between a line and a plane – co – planar lines – shortest distance between two skew lines – length of the perpendicular – intersection of three planes. (Book3: Chapter3:Sections 3.1, 3.2, 3.4, 3.6, 3.7, 3.8)

Unit – V	Equation of a sphere	09 Hours

Equation of a sphere - general equation - section of a sphere by a plane - equation of the circle - tangent plane - angle of intersection of two spheres - condition for the orthogonality - radical plane. (Book3: Chapter6:Sections 6.1, 6.2, 6.3, 6.4, 6.6, 6.7, 6.8)

Text Book(s):

1. Vittal P.R. and Malini V, Algebra, Analytical Geometry & Trignometry, Margam Publications, India.2018.

2. Manicavachagom Pillay T. K.and Natarajan T, A Text book of Analytical Geometry Part I-Two Dimensions, Divya Subramanian for Ananda Book Depot. 1996.

3. Shanti Narayan and Mittal P.K., Analytical Solid Geometry, S Chand Publishing, 2021.

Reference Books:

1. S. L. Loney, Co-ordinate Geometry.

2. Robert J. T. Bell, Co-ordinate Geometry of Three Dimensions.

3.William F. Osgood and William C. Graustein, Plane and Solid Analytic Geometry, Macmillan Company, New York, 2016

4. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.

Web Resources:

1. https://www.mooc-list.com/tags/analytical-geometry
2. https://archive.nptel.ac.in/course.html
3. https://onlinecourses.swayam2.ac.in/nce20_sc08/preview
4. https://www.coursera.org/lecture/fe-exam/analytic-geometry-and-trigonometry-straight-lines-SV8UL

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola	K1
CO2	Find the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola	K2
CO3	Explain in detail the system of Planes	K3
CO4	Explain in detail the system of Straight lines	K4
CO5	Explain in detail the system of Spheres	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	L	M	M	L	-	-	S	M	L
CO2	M	M	M	L	-	-	S	M	L
CO3	M	M	M	L	-	-	S	M	L
CO4	M	M	S	L	-	-	S	M	L
CO5	M	M	S	L	-	-	S	M	L

S - Strong, M – Medium, L - Low

Semester: II	Course Code: 23UMACT04	Hours/Week: 4	Credit: 4
COURSE TITLE : CORE IV - INTEGRAL CALCULUS			

Course Overview:

1. Integral calculus helps in finding the anti-derivatives of a function.
2. These anti-derivatives are also called the integrals of the function.
3. The process of finding the anti-derivative of a function is called integration.

Learning Objectives:

1. Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals.
2. Knowledge about Beta and Gamma functions and their applications.
3. Skills to Determine Fourier series expansions.

Unit - I	Reduction formulae	09 Hours

Reduction formulae - Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula. (Chapter1: Sections 13 and 14)

Unit - II	Multiple Integrals	09 Hours

Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates - Change of order of integration. (Chapter5: Sections 1, 2.1, 2.2 and 3.1)

Unit - III	Triple integrals	09 Hours

Triple integrals – applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces – change of variables - Jacobian. (Chapter5: Sections 4, 5.1, 5.2, 5.3, 6.1,7 and Chapter6: 1.1,1.2)

Unit - IV	Beta and Gamma function	09 Hours

Beta and Gamma functions – infinite integral – definitions – recurrence formula of Gamma functions – properties of Beta and Gamma functions - relation between Beta and Gamma functions - Applications. (Chapter7: Sections 2.1,2.2,2.3, 3, 4, and 6.)

Unit - V	Geometric Applications of Integration	09 Hours

Geometric Applications of Integration – Areas under plane curves: Cartesian coordinates - Area of a closed curve – Areas in polar coordinates - Trapezoidal rule – Simpson's rule and Physical Applications of Integral calculus – Centroid – Centre of mass of an arc - Centre of mass of a plane area - Centroid of a solid of revolution – Centroid of a surface of revolution . (Chapter2: Sections 1.1 to 1.4 , 2.1,2.2 and Chapter3: 1.1 to 1.5 Simple Applications)

Text Book(s):

1. Narayanan S and Manicavachagom Pillay T.K. Calculus-Volume II, (2006), S. Viswananthan Printers Pvt. Ltd.

Reference Books:

1. Narayanan S and Manicavachagom Pillay T.K. Calculus-VolumeII, (2006), S. Viswananthan Printers Pvt. Ltd. 1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.

Web Resources:

1. https://archive.nptel.ac.in/courses/111/105/111105122/
2. https://onlinecourses.swayam2.ac.in/cec24_ma10/preview
3. https://www.my-mooc.com/en/categorie/calculus

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae	K1
CO2	Evaluate double and triple integrals and problems using change of order of integration	K2
CO3	Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution	K3
CO4	Explain beta and gamma functions and to use them in solving problems of integration	K4
CO5	Explain Geometric and Physical applications of integral calculus	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	M	S	-	-	S	S	M	L
CO2	S	L	S	-	-	-	S	M	L
CO3	S	L	S	-	-	-	S	M	L
CO4	S	M	S	-	-	-	S	M	L
CO5	S	M	S	-	M	L	S	M	L

S - Strong, M – Medium, L – Low

Semester: II	**Course Code: 23UMASE03**	**Hours/Week: 2**	**Credit: 2**
COURSE TITLE : SKILL ENHANCEMENT COURSES III - COMPUTATIONAL MATHEMATICS			

Course Overview:

1. Computational Math is a specialized field that combines mathematical theory, practical engineering, and computer science. By studying a Computational Mathematics degree you will learn how to solve complex problems in science, engineering, and business, by using mathematical models and computational algorithms.

Learning Objectives:

1. Understand and use the structure of C++ programme, to solve different Numerical Methods.

Unit - I	**Algebraic and Transcendental Equations**	**09 Hours**

Algebraic and Transcendental Equations: Bisection method - Method of false position - Method of successive approximation – Newton - Raphson's method - Secant Method - Graeff's root squaring method.

Unit - II	**System of Linear Algebraic Equations**	**09 Hours**

System of Linear Algebraic Equations: Direct method - Iterative method - Eigen value problems.

Unit - III	C++ Program for Bisection method	09 Hours

C++ Program for Bisection method - C++ Program for Method of false position - C++ Program for Method of successive approximation - C++ Program for Newton - Raphson's method.

Unit - IV	C++ Program for Secant Method	09 Hours

C++ Program for Secant Method - C++ Program for Graeff's root squaring method - C++ Program for Gauss elimination method - C++ Program for Gauss Jordan method.

Unit - V	C++ Program for Jacobian method	09 Hours

C++ Program for Jacobian method - C++ Program for Gauss Seidal method - C++ Program for Largest eigen value by power method

Text Book(s):

1. R.M. Somasundaram and R.M. Chandrasekaran, "Numerical Methods with C++ Programming", Prentice Hall India Pvt. Ltd., New Delhi, 2005.

Reference Books:

1. Pallab Ghosh, "Numerical Methods with Computer Programs in C++", Prentice Hall India Pvt. Ltd., New Delhi, 2009.
2. T. Veerarajan and T. Ramachandran, "Numerical Methods with Programs in C", Second Edition, McGraw Hill Education Pvt. Ltd, New Delhi, 2006.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc22_ma24/preview
2. https://archive.nptel.ac.in/noc/courses/111/
3. https://www.mooc-list.com/tags/math

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	Describe the roots of algebraic equations using different methods like, Newton - Raphson method, Secant Method etc.	K1
CO2	Solve system of algebraic equations using direct and iterative methods.	K2
CO3	To write C++ Program to compute roots of algebraic equations using Bisection method,Newton - Raphson method etc.	K3
CO4	To write C++ Program to compute roots of algebraic equations using Secant method,Gauss Jordan method etc.	K4
CO5	To write C++ Program to solve the system of algebraic equations using the Jacobian method, Gauss Seidal method.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	S	S	M	S	S
CO2	M	S	S	S	S
CO3	S	S	S	S	S
CO4	M	S	S	M	S
CO5	M	S	S	S	M

S - Strong, M – Medium, L - Low

Semester: II	Course Code: 23UMAAT02	Hours/Week: 4	Credit: 4
COURSE TITLE : ALLIED MATHEMATICS II - DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS (FOR B. SC PHYSICS /B. SC CHEMISTRY)			

Course Overview:

1. The course begins with an introduction of control theory and the application of Laplace transforms in solving differential equations, providing a strong foundation in linearity, time-invariance, and dynamic system

Learning Objectives:

1. Develop the basic concepts of Maxima and Minima of two variables and Numerical methods problems.
2. To learn the second order differential equation with constant coefficients.
3. To learn the basic concepts of Laplace Transforms, Inverse Laplace Transforms &Applications.

Unit – I	Jacobian and Maxima & minima	09 Hours

Jacobian of two variables and three variables – Maxima and Minima functions of two variables – Problems only. (Chapter9: Sections 3 & 4)

Unit – II	Finite Differences	09 Hours

Finite difference – Higher differences – Construction of difference table – Interpolation of missing value – Newton's Forward and Newton's Backward difference formula (no proof) – Lagrange's Interpolation formula (no proof) - simple problems only. (Chapter7)

Unit - III	Second Order Differential Equations	09 Hours

Second Order Differential Equation with constant coefficients – Complementary function – Particular Integral and Solution of the type : e^{ax} , x^n , cos ax (*or*) sin ax ,$e^{as}x^{bs}$,e^{as} sin bx, e^{as} cos bx – Problems only. (Chapter23)

Unit - IV	Laplace Transforms	09 Hours

Definition of Laplace Transforms – Standard formula – Linearity property – shifting property – Change of Scale property – Laplace Transforms of derivatives – Problems. (Chapter27)

Unit – V	Inverse Laplace Transforms	09 Hours

Standard formula- Elementary theorems (no proof) – Applications to solutions of second order differential equations with constant coefficients – simple problems. (Chapter27)

Text Book(s):

1. Dr .P. R. Vittal, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2016.

Reference Books:

1. S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011.
2. P. Kandasamy, K. Thilagavathy, Allied Mathematics Volume I, S. Chand publication, July 2012

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc22_ma62/preview
2. https://www.mooc-list.com/tags/laplace-transform

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Explain Jacobian of two variables and three variables and Maxima and Minima functions of two variables.	K1
CO2	Explain Finite difference and Higher differences and Construction of difference table and Newton's Forward Backward difference formula and Lagrange's Interpolation formula.	K2
CO3	Explain Second Order Differential Equation with constant coefficients and Particular Integral	K3
CO4	Explain definition of Laplace Transforms and standard formula and linearity property and shifting property and Change of Scale property and Laplace Transforms of derivatives	K4
CO5	Explain standard formula and elementary theorems and Applications to solutions of second order differential equations with constant coefficients.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	M	S	-	-	-	S	M	M
CO2	M	L	S	L	-	-	S	M	L
CO3	S	L	S	L	-	-	S	M	L
CO4	S	L	S	-	-	-	S	M	L
CO5	S	L	S	-	-	-	S	M	L

S - Strong, M – Medium, L – Low

Semester: II	Course Code: 23UMAAP01	Hours/Week: 2	Credit: 2
COURSE TITLE: ALLIED MATHEMATICS – PRACTICAL I (FOR B. SC PHYSICS /B. SC CHEMISTRY)			

Course Overview:

1. This course is designed for the students to expose the topics such as expansions of trigonometric functions, partial differential equations, vector differentiation, and integration.

Learning Objectives:

1. Acquire knowledge about Matrices and Cayley – Hamilton Theorem.
2. Understand the concepts of differentiation and Vector point function

Unit – I	Matrices	09 Hours

Rank of Matrix – Problems up to (3x3) Matrix – Characteristics equation of a Matrix – Cayley Hamilton Theorem (statement only) – Problems to verify Cayley Hamilton Theorem. (Chapter 5)

Unit – II	Leibnitz formula for n^{th} derivative	09 Hours

Leibnitz formula (without proof) for nth derivative – Problems. (Page no: 8.23 to 8.39 of the Text book)(Chapter 8)

Unit - III	Partial Differentiation	09 Hours

Euler ‘s theorem on homogeneous function (without proof) – Problems to verify Euler’s Theorem – Partial derivative – problems (Page no. 9.1 to 9.13 and 9.18 to 9.27 of the Text Book)(Chapter 9)

Unit - IV	Vector Differentiation	09 Hours

Scalar and Vector point functions – Gradient of scalar point functions – Problems only. (Chapter28)

Unit – V	Divergence and Curl of Vector point functions :	09 Hours

Divergence and Curl of vector point functions – Solinoidal vector – Irrotational vector – Problems only. (Chapter 28)

Text Book(s):

1. Dr. P. R. Vittal, Allied Mathematics , Margham publication, Chennai – 17, Reprint 2016

Reference Books:

1. S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011.
2. P. Kandasamy, K. Thilagavathy, Allied Mathematics Volume I, S. Chand publication, July 2012

Web Resources:

1. https://onlinecourses.nptel.ac.in/
2. https://www.mooc.org/

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Explain in detail about Rank of Matrix and Characteristic equation of a Matrix and Cayley Hamilton Theorem and Problems to verify Cayley Hamilton .	K1
CO2	Explain Leibnitz formula for nth derivative	K2
CO3	Explain Euler's theorem on homogeneous function and Problems to verify Euler's Theorem and Partial derivative.	K3
CO4	Explain Scalar and Vector point functions and Gradient of scalar point functions	K4
CO5	Explain Divergence and Curl of vector point functions and Solinoidal vector and Irrotational vector.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	L	M	-	-	-	S	M	L
CO2	M	L	M	L	-	-	S	M	L
CO3	S	L	M	L	-	-	S	M	L
CO4	S	L	M	-	-	-	S	M	L
CO5	S	L	M	-	-	-	S	M	L

S - Strong, M – Medium, L – Low

Semester: II	Course Code: 23UMAEGS04	Hours/Week: 5	Credit: 3
COURSE TITLE : ELECTIVE COURSE GENERIC SPECIFIC EC II - OPTIMIZATION TECHNIQUES (FOR ALL COMPUTER SCIENCE DEPARTMENTS)			

Course Overview:

1. The purpose of this course is to develop knowledge in the field of optimization techniques their basic concepts, principles. linear programming and queuing theory

Learning Objectives:

1. To know the concepts of Mathematical formulation and solving L.P.P
2. To find the solutions of Transportation and Assignment models.
3. To teach the techniques for converting the real life problems as Mathematical problems and solving them.

Unit – I	Linear Programming Formulation and Graphical Method	09 Hours

Introduction - Requirements for employing LPP technique – Mathematical Formulation of L.P.P. - Basic assumptions - Graphical method of the Solution of a L.P.P. – Some more cases – Advantage of Linear Programming – Limitations of Linear Programming. Chapter 2 (Sections 2.1 – 2.8)

Unit – II	Transportation Model	09 Hours

Introduction - Mathematical formulation of a transportation problem - Methods for finding initial basic feasible solution – Transportation algorithm or MODI method – Degeneracy in Transportation problems – Unbalanced Transportation Problems – Maximization case in Transportation problems. Chapter 7
(Sections 7.1 – 7.5)

Unit - III	Assignment Problem	09 Hours

Introduction – Mathematical formulation of an Assignment Problem – Difference between the Transportation Problem and Assignment Problem – Assignment Algorithm or Hungarian Method – Unbalanced Assignment Models – Maximization case in Assignment Problems. Chapter 8 (Sections 8.1 – 8.2, 8.4 - 8.7)

Unit - IV	Sequencing Problems	09 Hours

Introduction – Assumptions of solving a sequencing Problem - Definition - Procedure for finding Optimum Sequence (n jobs on 2 machines) – Processing n jobs on three machines – Processing n jobs on m machines. Chapter 14 (Sections 14.1 – 14.6).

Unit – V	Scheduling by PERT and CPM:	09 Hours

Introduction – Basic Terminologies – Rules for constructing a project network – Network computations – Floats – Programme Evaluation Review Technique (PERT) – Basic differences between PERT and CPM. Chapter 15 (Sections 15.1 – 15.7)

Text Book(s):

1. Sundaresan,V., Ganapathy Subramanian, K.S. and Ganesan, K. Resource Management Techniques. [Seventh Edition]. AR Publication, Chennai.2013

Reference Books:

1. Kantiswarup., Gupta, P.K. and Man Mohan. Operations Research.[Seventeenth Edition]. Sultan Chand and Sons, New Delhi. 2020. 2. Gupta, P.K
2. Gupta, P.K. and Hira, D.S. Operations Research. [Eighth Edition].

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc21_me10/preview
2. https://www.mooc-list.com/tags/optimization

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Formulate and solve real life problems through L.P.P	K1
CO2	Compute the optimum Transportation schedule.	K2
CO3	Find the optimum Assignment model.	K3
CO4	Solve Sequencing problems	K4
CO5	Use the techniques for planning and scheduling of projects.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	M	S	S	M	L	S	M	S	S
CO2	M	S	S	M	L	S	M	S	S
CO3	M	S	S	M	L	S	M	S	S
CO4	M	S	S	M	L	S	M	S	S
CO5	M	S	S	M	L	S	M	S	S

S - Strong, M – Medium, L – Low

Semester: II	**Course Code: 23UMAGSP03**	**Hours/Week: 2**	**Credit: 2**
COURSE TITLE: OPTIMIZATION TECHNIQUES - PRACTICAL			

Course Overview:

1. This course is to develop knowledge in the field of optimization techniques their basic concepts, principles. Linear programming and queuing theory.

Learning Objectives:

1. Acquire knowledge about LPP and graphical method.
2. Understanding the concepts of Rules for constructing a project network.

Unit - I	**Linear Programming**	**09 Hours**

Linear programming problem – Graphical Method

Unit - II	**Transportation**	**09 Hours**

Transportation Problem - Finding initial basic feasible solution only by using North - West Corner Rule, Least cost Method - Vogel's Approximation Method.

Unit - III	**Assignment problem**	**09 Hours**

Assignment Problem - Finding optimal solution by using Hungarian Method.

Unit - IV	**Sequencing problem**	**09 Hours**

Sequencing problem - N jobs to be operated on Two Machines.

Unit - V	Network	09 Hours

Network - Rules for constructing a project network - Floats.

Text Book(s):

1. Sundaresan, V. Ganapathy Subramanian K.S. and Ganesan. K, Resource Management Techniques [Seventh Edition], AR Publication, Chennai, 2013.

Reference Books:

1. Kaniswarup, Gupta. P.K. and Man Mobhan, Operations Research [Seventeenth Edition], Sultan Chand and Sons. New Delhi, 2020.
2. Gupta. P.K and Hira, D.S. Operations Research [Eight Edition], Sultan Chand and Sons, New Delhi, 2020.
3. Kalabathy. S. Operation Research [Fourth Edition], Vikas Publishing House, Chennai, 2012.

Web Resources:

1. https://nptel.ac.in

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Formulate and solve real life problems through L.P.P.	K1
CO2	Compute the optimum Transportation schedule	K2
CO3	Find the optimum Assignment model.	K3
CO4	Solve Sequencing problems..	K4
CO5	Use the techniques for planning and scheduling of projects	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**
CO1	M	S	S	M	L	S	M	M	M	M
CO2	M	S	S	M	L	S	M	M	M	M
CO3	M	S	S	M	L	S	M	M	M	M
CO4	M	S	S	M	L	S	M	M	M	M
CO5	M	S	S	M	L	S	M	M	M	M

S - Strong, M – Medium, L – Low

Semester: III	**Course Code: 23UMACT05**	**Hours/Week: 5**	**Credit: 4**
COURSE TITLE : CORE V - VECTOR CALCULUS AND ITS APPLICATIONS			

Course Overview:

1. Vector calculus studies the relationship between vectors and the properties of line integrals and surface integrals. The following are some of the properties of vectors as used in vector calculus: Vectors have magnitude and direction. Vectors can be one, two, or three-dimensional.

Learning Objectives:

1. Knowledge about differentiation of vectors and on differential operators. Knowledge about derivatives of vector functions.
2. Skills in evaluating line, surface and volume integrals.
   The ability to analyze the physical applications of derivatives of vectors.

Unit - I	**Vector point function**	**09 Hours**

Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product. (Chapter1: Sections 1.1 to 1.5)

Unit - II	The vector operator	09 Hours

The vector operator 'del', The gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors – simple applications. (Chapter2: Sections 2.1 to 2.7.)

Unit - III	Laplacian operator	09 Hours

Laplacian operator, Vector identities - Line integral - simple problems. Chapter2: Sections 2.8 and Chapter3: 3.1, 3.2, 3.3, 3.4)

Unit - IV	Surface integral	09 Hours

Surface integral - Volume integral – Applications. (Chapter3: 3.5, 3.6)

Unit - V	Gauss divergence Theorem	09 Hours

Gauss divergence Theorem, Stoke's Theorem, Green'sTheorem in two dimensions Applications to real life situations. (Chapter4: 4.1 to 4.5)

Text Book(s):

1. Duraipandian, P and Laxmiduraipandian – Vector Analysis(Revised Edition - Reprint 2005) Emerald Publishers.

Reference Books:

1. J.C. Susan, Vector Calculus,, (4th Edn.) Pearson Education,Boston, 2012..

Web Resources:

1. https://www.mooc-list.com/tags/vector-calculus
2. https://onlinecourses.nptel.ac.in/noc20_ma07/preview

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products	K1
CO2	Applications of the operator 'del' and to Explain soleonidal and ir-rotational vectors	K2
CO3	Solve simple line integrals	K3
CO4	Solve surface integrals and volume integrals	K4
CO5	Verify the theorems of Gauss, Stoke's and Green's(Two Dimension)	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	M	S	L	-	-	S	M	L
CO2	S	M	S	L	M	-	S	M	L
CO3	S	S	S	S	-	-	S	S	L
CO4	S	S	S	S	-	-	S	S	L
CO5	S	S	S	S	M	-	S	S	L

S - Strong, M – Medium, L – Low

Semester: III	Course Code: 23UMACT06	Hours/Week: 4	Credit: 4
COURSE TITLE : CORE VI - DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS			

Course Overview:

1. In Mathematics, a differential equation is an equation that contains one or more functions with its derivatives. The derivatives of the function define the rate of change of a function at a point. It is mainly used in fields such as MATHEMATICS, engineering, biology and so on. The primary purpose of the differential equation is the study of solutions that satisfy the equations and the properties of the solutions.

Learning Objectives:

1. Knowledge about the methods of solving Ordinary and PartialDifferential Equations.
2. The understanding of how Differential Equations can be used as a Powerful tool in solving problems in science.

Unit - I	Ordinary Differential Equations	09 Hours

Ordinary Differential Equations: Variable separable - Homogeneous Equation – Non - Homogeneous Equations of first degree in two variables - Linear Equation - Bernoulli's Equation - Exactdifferential equations. (Chapter2: Sections 1 to 6)

Unit - II	Equation of first order but of higher degree	09 Hours

Equation of first order but of higher degree: Equation solvable for dy/dx - Equation solvable for y - Equation solvable for x - Clairauts' form - Linear Equations with constant coefficients - Particularintegrals of algebraic, exponential, trigonometric functions and their products. (Chapter4: Sections 1,2 ,3 and Chapter5: 1 to 4)

Unit - III	Simultaneous linear differential equations	09 Hours

Simultaneous linear differential equations - Linear Equations of the Second Order - Complete solution in terms of known integrals - Reduction to the Normal form - Change of the Independent Variable - Method of Variation of Parameters. (Chapter6 and Chapter 8: Sections 1 to 4)

Unit - IV	Partial differential equation	09 Hours

Partial differential equation Formation of PDE by Eliminating arbitrary constants and arbitrary functions - complete integral - singular integral-General integral - Lagrange's Linear

Equations – Simple Applications. (Chapter12: 1,2,3, and 4)

Unit - V	Special methods	09 Hours

Special methods – Standard forms - Charpit's Methods - Simple Applications (Chapter12: 5, and 6)

Text Book(s):

1. Narayanan S and Manicavachagom Pillay T.K. Differential
2. equations and its application, 2006, S. Viswananthan Printers Pvt. Ltd.

Reference Books:

1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc24_ma37/preview
2. https://onlinecourses.swayam2.ac.in/cec22_ma10/preview

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Determine solutions of homogeneous equations, non-homogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations	K1
CO2	Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products	K2
CO3	Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters	K3
CO4	Form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations	K4
CO5	Explain standard forms and Solve Differential equations using Charpit's method	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	M	S	S	L	S	S	M	M
CO2	S	L	S	M	L	-	S	M	L
CO3	S	L	S	M	L	-	S	S	L
CO4	S	L	S	M	M	L	S	S	L
CO5	S	L	S	M	M	L	S	S	L

S - Strong, M – Medium, L – Low

Semester: III	**Course Code: 23UMASE04**	**Hours/Week: 1**	**Credit: 1**
COURSE TITLE : SKILL ENHANCEMENT COURSES IV - STATISTICS WITH EXCEL PROGRAMMING			

Course Overview:

1. Learn all about Descriptive and Inferential Statistics with practical examples

Learning Objectives:

1. Acquire the knowledge of Statistics with Excel Programming
2. Differentiate statistical nomenclature when calculating variance.

Unit - I	**Distribution of data**	**09 Hours**

Characteristics of data- Frequency distribution - Procedure for Constructing a Frequency Distribution - Using Excel to Construct a Frequency Distribution - Relative Frequency Distribution - Cumulative Frequency Distribution. (Chpater-2: Pages 58 to 70)

Unit - II	**Histograms**	**09 Hours**

Relative Frequency Histogram-NormalDistribution-Common Distribution Shapes – Skewness - Using XLSTAT for Histograms - Graphs-Using Excel to Construct a Scatterplot - Correlation Coefficient. (Chapter-2: Pages 70 to 81)

Unit - III	**Time-Series**	**09 Hours**

Group – Dotplots - Using XLSTAT for Stem plots - Bar Graphs - Using Excel to Create Bar

Graphs - Pareto Charts - Pie Charts - Using Excel to Create Pie Charts - Frequency Polygon - Using Excel to Create Frequency Polygons. (Chapter-2: Pages 81 to 98)

Unit - IV	Descriptive statistics	09 Hours

Measures of Center – Mean - Using Excel to Calculate the Mean – Median - Using Excel to Find the Median. (Chapter-3: Pages 110 to 114)

Unit - V	Mode	09 Hours

Using Excel to Find the Mode – Midrange - Using Excel to Calculate the Midrange - Weighted Mean - Using Excel for Descriptive Statistics. (Chapter-3: Pages 114 to 125)

Text Book(s):

1. Mario F. Triola, "Elementary Statistics Using Excel", FifthEdition, Pearson New International Edition, 2014. (Chapter 2 and 3).

Reference Books:

1. E. Balagurusamy, "Computer Oriented Statistical and Numerical Methods", Macmillan Publishers India Limited, 2000.

Web Resources:

1. https://www.coursera.org/learn/excel-data-analysis
2. https://onlinecourses.nptel.ac.in/noc21_ge21/preview

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Handle distribution of data and analyses the characteristics of data using Excel.	K1
CO2	To find Normal distribution, common distribution shapes, Correlatio Coefficient and plot graphs using Excel.	K2
CO3	Create Time-Series Graphs, Dot plots, Stem plots, Bar Charts, Pie Charts using Excel.	K3
CO4	Compute Mean and Median using Excel.	K4
CO5	Compute Mode, Midrange, Weighted Mean using Excel.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	M	M	S	S	L	S	S	M	M
CO2	M	L	S	L	S	-	S	M	L
CO3	M	L	S	L	S	-	S	S	L
CO4	M	L	S	M	M	L	S	S	L
CO5	M	L	S	M	M	L	S	S	L

S - Strong, M – Medium, L – Low

Semester: III	**Course Code: 23UMASE05**	**Hours/Week: 2**	**Credit: 2**
COURSE TITLE : SKILL ENHANCEMENT COURSE V - MATHEMATICS FOR COMPETITIVE EXAMINATION – III			

Course Overview:

1. The main purpose of adding the category of Quantitative Aptitude to a competitive exam is to test your ability to solve basic mathematical problems logically.

Learning Objectives:

1. Remembering the concept of Logarithms.
2. Understanding the concept of Simple Interest – Compound Inters

Unit - I	**Simple Interest**	**09 Hours**

Simple Interest – Compound Interest.(Chap – 21 & 22)

Unit - II	**Logarithms**	**09 Hours**

Logarithms - Area.(Chap – 23 & 24)

Unit - III	**Volume**	**09 Hours**

Volume & Surface Areas – Races & Games of Skill. (Chap – 25 & 26)

Unit - IV	**Calendar**	**09 Hours**

Calendar - Clocks.(Chap – 27 & 28)

Unit - V	**Stocks**	**09 Hours**

Stocks & Shares.(Chap – 29)

Text Book(s):

1. R. S. Aggarwal, Quantitative Aptitude for Competitative Examinations, S. Chand co Ltd., 152. Anna Salai, Chennai,2010

Reference Books:

1. Quantitative Aptitude ‘’by Abhijit Guha, Tata McGraw HillPublishing Company Limited, New Delhi (2005)

Web Resources:

1. https://nptel.ac.in/courses/110104066
2. https://www.mygreatlearning.com/academy/learn-for-free/courses/quantitative-aptitude-basics

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom’s Level
CO1	Explain in detail about Simple Interest and Compound Interest	K1
CO2	Explain Logarithms and Area.	K2
CO3	Explain Volume & Surface Areas and Races & Games of Skill.	K3
CO4	Explain Calendar and Clocks.	K4
CO5	Explain Stocks & Shares.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	L	S	-	-	-	S	M	L
CO2	M	L	S	L	-	-	S	M	L
CO3	S	L	S	L	-	-	S	M	L
CO4	S	L	S	-	-	-	S	M	L
CO5	S	L	S	-	-	-	S	M	L

S - Strong, M – Medium, L – Low

Semester: III	Course Code: 23USTAT01	Hours/Week: 4	Credit: 4
COURSE TITLE: ELECTIVE COURSE III - ALLIED - STATISTICAL METHODS – I			

Course Overview:

1. statistics is the application of probability theory, a branch of mathematics, to statistics, as opposed to techniques for collecting statistical data

Learning Objectives:

1. To introduce the basic concepts of probability theory, random variables, probability distribution.
2. To introduce t the statistical concepts and develop analytical skills.

Unit - I	Probability, Random Variable and Mathematical Expectation	09 Hours

Definitions – Addition and Multiplication Theorem of Probability – Conditional probability – Random variable (discrete and continuous) – Distribution functions – Marginal and Conditional Distributions – Mathematical Expectation – Moment generating function – Characteristic function (concept only) – Tchebychev_s inequality - Simple Problems.

Unit - II	Discrete and Continuous Distributions	09 Hours

Binomial and Poisson Distributions – Derivations – Properties and Applications - Simple Problems – Normal distribution – Derivations – Properties and Applications - Simple Problems

Unit - III	Measures of Central Tendency, Measures of Dispersion and Skewness	09 Hours

Definitions – Mean , Median , Mode , Geometric mean , Harmonic mean – Merits and demerits – Range , Quartile deviation , Mean deviation and their coefficients - Standard deviation – Co-efficient of Variation - Merits and demerits – Measure of Skewness – Karl Pearson's and Bowley_s Coefficient of Skewness.

Unit - IV	Curve Fitting	09 Hours

Method of least square – Fitting of a straight line and second degree Parabola,
Fitting of Power Curve and Exponential Curves – Simple Problem.

Unit - V	Correlation and Regression	09 Hours

Definition – Types and methods of measuring correlation – Scatter diagram , Karl Pearson's correlation coefficient and Spearman rank correlation coefficient - Regression lines - Regression coefficients – Properties – Regression equations

Text Book(s):

1. Gupta S. C and Kapoor V. K (2004), Fundamentals of Mathematical Statistics, (11th edition), Sultan Chand & Sons, New Delhi.

2. Gupta. S. P. (2001), Statistical Methods, Sultan Chand & Sons, New Delhi.

Reference Books:

1. Sancheti D. C and Kapoor V. K (2005), Statistics (7th Edition), Sultan Chand & Sons, New Delhi.

2. Robert V. Hogg, Allen T. Craig, Joseph W. McKean, Introduction to mathematical statistics, Pearson Education. .

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc24_ma30/preview

2. https://www.mooc-list.com/tags/statistics

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Understand the random experiments in real life situations.	K1
CO2	Understand the axioms of probability in real life situations.	K2
CO3	Compute Bernoulli trials and understand the rare case population	K3
CO4	Learn the usage of central tendencies, dispersion and skewness	K4
CO5	Obtain the relationship between two random variables.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	S	M	M	M	S	M	S	M
CO2	S	S	S	S	M	S	M	S	M
CO3	S	S	S	M	S	S	S	S	L
CO4	S	S	S	M	S	S	S	S	M
CO5	S	S	M	M	M	S	S	S	M

S - Strong, M – Medium, L – Low