SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

[An Autonomous College Affiliated to Periyar University, Salem, Tamil Nadu]

[Accredited by NAAC with 'A' Grade with CGPA of 3.27]

[Recognized 2(f) & 12(B) Status under UGC Act of 1956]

Katteri – 636 902, Uthangarai (Tk), Krishnagiri (Dt)

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DEGREE OF BACHELOR OF SCIENCE IN MATHEMATICS
WITH
COMPUTER APPLICATION
CHOICE BASED CREDIT SYSTEM (CBCS)

REGULATIONS AND SYLLABUS FOR

B.Sc. MATHEMATICS WITH COMPUTER APPLICATION PROGRAMME

(SEMESTER PATTERN)

(For Students Admitted in the College from the Academic Year 2024-2025 Onwards)

REGULATIONS AND SYLLABUS FOR B.Sc. MATHEMATICS

WITH

COMPUTER APPLICATION PROGRAMME

(For Students Admitted in the College from the Academic Year 2024-2025 Onwards)

1. Vision of the Department

To create teaching and research excellence in mathematics to fulfill the mathematical needs of the society and nation.

2. Mission of the Department

To provide high quality mathematical graduates who are relevant to industry and commerce, mathematical education and research in science and technology.

3. Definitions

(i) Programme: Programme means a course of study leading to the award of the degree in a discipline.

(ii) Course: Course refers to the subject offered under the Degree Programme.

4. Aims of the Programme

1. To attract mathematically able students and to provide for them academically coherent undergraduate programmes, with courses that range from the fundamental to the advanced, reflecting the scholarship and research interests of staff.
2. To provide Degree programmes in mathematics which are intellectually challenging and rigorous, and whose graduates are well-placed to pursue postgraduate studies or to enter employment.
3. To provide combined degree programmes, given with other UCL departments, which are designed for students seeking expertise in more than one discipline or additional skills such as a foreign language, computing or management processes.
4. To provide students with friendly pastoral and academic support which will help them develop their capabilities in an environment where both independent study and interaction with staff and fellow students are encouraged.
5. Gain in-depth knowledge by students in the subject discipline of taxonomy.
6. Mould students as accountable citizens having awareness of most basic domain-independent knowledge, including critical thinking and communication.
7. Enable students to prepare for different research/teaching qualification and competitive examinations, such as CSIR-NET, SET, TRB, TNPSC and UPSC.

5. Programme Outcomes (PO)

PO1	**Communicate Effectively** - Well versed in communicating both in English (as medium of instruction) and Tamil (mother's tongue), distinguish between professional and non-professional dialogues. Develop LSRW (Listening, Speaking, Reading, and Writing) skills with advanced technologies.
PO2	**Environment Concern** - Follow RRRR (Reduce, Reuse, Recycle, and Refuse) and develop affinity towards environment and practice save Nature and Water.
PO3	**Ethical and Healthy Practice** - Adhere to values in day to day life, practice yoga and other physical exercises, hence, develop self - respect and self-esteem, have strong integrity.
PO4	**Social Consciousness** - Understand the rural situations through ERP (Empowering Rural People), and develop social consciousness, solve the issues through interaction, become mediator/ moderator between government and people, and become true citizen of our Nation.
PO5	**Subject Specialist** - Acquaint their own subject and integrate with other disciplines (CBCS) with advanced technologies and become a Regional, National and Global competitor.

6. Programme Specific Outcomes (PSO)

PSO1	Students will develop and apply concepts of expressions, equations and inequalities to investigate and describe.
PSO2	Real Numbers and Algebraic Expressions. Classify and Define Properties of Real Numbers. Solve Multi-Step Linear Equations. Problem Solving.
PSO3	Simplify and perform arithmetic operations on rational algebraic expressions, including those with radicals and perform the basic arithmetic operations of addition, subtraction, multiplication and division on polynomials.
PSO4	Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.
PSO5	The course includes axioms of real number systems, uniform convergence of sequences and series of functions, equi-continuity.
PSO6	Formulate and solve problems as networks and graphs. Develop linear

	programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transhipment problems. Use CPM and PERT techniques, to plan, Schedule and control project activities.
PSO7	Complex numbers, analytic functions, Cauchy integral theorem, Cauchy integral formula, power series and conformal mapping.
PSO8	Fluid, solid or continuum mechanics. You have good knowledge of a broad range of methods and techniques based on mechanics and can use them for analysis and problem solving.
PSO9	Correlation and Regression analysis, Multiple Regression and Statistical Forecasting.
PSO10	Analyse vector functions to find derivatives, tangent lines, integrals, arc length, and curvature, Differentiate vector fields, Determine gradient vector fields and find potential functions, Evaluate line integrals directly and by the fundamental theorem.
PSO11	To appreciate the basic principles of Boolean algebra, Logic, Set Theory, Permutations.

7. Eligibility for Admission

A candidate who has passed Higher Secondary Examination in Academic or vocational stream with Mathematics under higher secondary board of examination, Tamil Nadu or an examination accepted as Equivalent there to by the syndicate subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the B.Sc degree examination of this Autonomous College affiliated to Periyar University after a course of study of three academic years.

8. Duration of the Programme

The Programme for the Degree of Bachelor of Science (B.Sc.) in Mathematics shall consist of three academic years divided into six semesters. Each Semester consists of 90 working days (450 hours).

9. Features of Choice Based Credit System

Under Choice Based Credit System (CBCS), a set of Courses consisting of Core Courses, Elective Courses, Skill Based Elective Courses and Non-Major Elective Courses are offered. Beside the Core Courses, which are totally related to the major subject, the

students have the advantage of studying supportive papers and Non-Major Courses. This provides enough opportunity to the students to learn not only the major courses but also inter disciplinary and application oriented courses.

10. Syllabus

The syllabus of the B.Sc. Mathematics Degree Programme is divided into the following Courses:

(i) Language Courses:

(ii) Core Courses: The Core Courses are related to the Programme concerned including practical and project offered under the Programme.

(iii) Elective Courses: There are THREE Elective Courses offered under the Programme related to the major or non-major but are to be selected by the students.

(iv) Skill Based Elective Courses (SBEC): This course aims to impart advanced and recent developments in the concerned discipline.

(v) Non-Major Elective Courses (NMEC): Irrespective of the discipline, the student can select papers that are offered by other disciplines as non-major elective course.

11. Programme of Study

The Programme of study for the Degree shall be in the Branch – Mathematics (Choice Based Credit System) with internal assessment comprised of instructions in the following subjects according to the syllabi and books prescribed from time to time.

12. Credit

Weightage given to each course of study is termed as Credit.

13. Credit System

The weightage of credits are spread over to four different semesters during the period of study and the cumulative credit point average shall be awarded based on the credits earned by the student. A total of 140 Credits are prescribed for the B.Sc. Mathematics Degree Programme which is the minimum Credit requirement for the three year B.Sc. Mathematics Degree Programme.

14. Breakup of Marks and Credits

The break-up of marks and credits for the B.Sc. Mathematics Degree Programme is as follows:

Sl. No.	Part	Subject	Marks	Credits

1.	I	Language – Tamil	400	12
2.	II	Language – English	400	12
3.	III	Core – Theory	1400	66
		Allied – Theory/Practical	600	21
		Major Elective Courses	300	12
4.	IV	Skill Based Elective Courses	400	9
		Non-Major Elective Courses	200	4
		Environmental Studies	100	2
		Value Education	100	2
5.	V	Add-on Couse	200	8
Total			**4100**	**148**

* The students are advised to complete a **SWAYAM/MOOC/NPTEL/CEC.,etc** Coursebefore the completion of the even semester of each year of study and submit the course completion certificate to the HOD. Two credits will be given to the candidates who have successfully completed.
* The field trip preferably relevant to the course should be undertaken every year.

15. Examinations

The examinations consist of Continuous Internal Assessment (CIA) and end of semester examinations (ESE). The ESE shall be of Three Hours duration for each theory course at the end of every semester. The candidate failing in any course(s) will be permitted to appear for each failed course(s) in the subsequent examination. The end of semester practical examinations shall be of Three Hours for the each practical course conducted at the end of every even semester. To maintain uniformity, particularly for interdepartmental transfer of credits, there shall be a uniform pattern of examination to be adopted by all the teachers offering courses. There shall be three tests, one seminar and one assignment for CIA and ESE during each semester. The distribution of marks for CIA and ESE shall be 25 marks and 75 marks, respectively. Further, the distribution of CIA will be 15 marks for test, 5 marks for assignment and 5 marks for attendance. The average of the highest two test marks out of the three CIA tests will be taken for CIA.

16. Components of Continuous Internal Assessment (CIA)

Components	**Marks**	**Total Marks**

Theory			
CIA I	75	(75+75 = 150/10) 15	25
CIA II	75		
Assignment		05	
Attendance		05	
Practical			
CIA		25	40
Practical Observation Notebook		10	
Attendance		05	

17. Question Paper Pattern

Bloom's Taxonomy Based Assessment Pattern

(K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate)

(i) Theory Examinations (CIA I & CIA II = 25 Marks and ESE = 75 Marks)

Knowledge Level	**Section**	**Marks**	**Description**	**Total Marks**
K1	A(Answer All) Q1–Q15	15 × 1 = 15	Multiple Choice Questions (MCQ) (Three questions from each unit)	15
K2	B (Answer any THREE out of FIVE) Q16–Q20	3 × 5 = 15	Short Answers (One question from each unit)	15
K3 & K4	C(Answer All) (Either or Pattern) Q21–Q25	5 × 9 = 45	Descriptive/Detailed Answers (Two questions from each unit)	45
Total Marks				**75**

Passing Minimum (CIA) 40% = 10 Marks

Passing Minimum (ESE) 40% = 30 Marks

40 Marks

(ii) Practical Examinations (CIA = 40 Marks and ESE = 60 Marks)

Knowledge Level	**Components**	**Marks**	**Total**
K3	Experiments	50	60
K4	Record Work	10	
K5			

Passing Minimum (CIA) 40% = 16 Marks

Passing Minimum (ESE) 40% = 24 Marks

40 Marks

The candidate shall be declared to have passed the examination if the candidates secure not less than 30 marks out of 75 marks in the semester examination in each theory course and 10 marks out of 25 marks in the CIA and in total not less than 40 marks. For the practical course, 24 marks out of 60 marks in the semester examination and the record notebook taken together and 16 marks out of 40 marks in the CIA and in total 40 marks. There is no passing minimum for the record notebook. However, submission of the record notebook is necessary. Candidate who does not obtain the required minimum marks for a pass in a Course/Practical shall be declared Re-Appear (RA) and the candidate has to appear and pass the same at a subsequent appearance.

18. Maximum duration for the completion of the B.Sc. Mathematics programme

The maximum duration for completion of the B.Sc. Mathematics Programme shall not exceed twelve semesters.

19. Commencement of this Regulation

This regulation and syllabus shall take effect from the academic year 2023-2024 for students who are admitted to the first year of the Programme during the academic year 2023-2024 and thereafter.

20. Grading

Once the marks of the cumulative CIA and ESE are available, they will be added. The marks thus obtained will then be graded as per details given below:

Marks and Grades:

The following table gives the marks grade points, letter grades and classification to indicate the performance of the candidate.

Range of Marks	Grade Points	Letter Grade	Description
90–100	9.0–10.0	O	Outstanding
80–89	8.0–8.9	D+	Excellent
75–79	7.5–7.9	D	Distinction
70–74	7.0–7.4	A+	Very Good
60–69	6.0–6.9	A	Good
50–59	5.0–5.9	B	Average
40–49	4.0–4.9	C	Satisfactory
00–39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

Ci= Credits earned for course i in any semester, Gi= Grade Point obtained for course i in any semester, n = Semester in which such course were credited

For a semeste

Grade Point Average [GPA] = ΣiCiGi / ΣiCi

$$GPA = \frac{\text{Sum of the multiplication of grade points by the credits of the courses}}{\text{Sum of the credits of the courses in a semester}}$$

For the entire Programme

Cumulative Grade Point Average [CGPA] = ΣnΣiCniGni / ΣnΣiCni

$$GPA = \frac{\text{Sum of the multiplication of grade points by the credits of the entire programme}}{\text{Sum of the credits of the courses of the entire programme}}$$

21. Classification of Successful Candidates

A candidate who passes all the examinations and securing following CGPA and Grades shall be declared as follows

CGPA	Grade	Classification of Final Result
9.5–10.0	O+	First Class – Exemplary
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C+	Third Class
4.0 and above but below 4.5	C	

22. Ranking

A candidate who qualifies for the B.Sc. Mathematics, passing all the Examinations in the first attempt within the minimum period prescribed for the Programme from the date of admission to the Programme and secures first, second or third class shall be eligible for ranking and such ranking will be confined to 10% of the total number of candidates qualified in that particular subject to a maximum of 10 ranks.

23. Conferment of the Degree

No candidate shall be eligible for conferment of the Degree unless he/she has undergone the prescribed Programme of study for a period of not less than six Semesters in an Institution approved by and affiliated to the Periyar University and earns has passed the Examinations as have been prescribed.

24. Transitory Provision

Candidates who have undergone the Programme of Study prior to the Academic Year 2023-2024 will be permitted to take the Examinations under those Regulations for a period of six years i.e. up to and inclusive of the Examination of April 2027. Thereafter, they will be permitted to take the Examination only under the Regulations in force at that

time.

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1. **Introduction**

B.Sc. Mathematics with Computer Application: Programme Outcome, Programme Specific Outcome and Course Outcome

Mathematics is the study of quantity, structure, space and change, focusing on problem solving, with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics. The Bachelor's Degree B.Sc. Mathematics is awarded to the students on the basis of knowledge, understanding, skills, attitudes, values and academic achievements expected to be acquired by learners at the end of the Programme. Learning outcomes of Mathematics are aimed at facilitating the learners to acquire these attributes, keeping in view of their preferences and aspirations for gaining knowledge of Mathematics.

Bachelor's degree in Mathematics is the culmination of in-depth knowledge of algebra, calculus, geometry, differential equations and several other branches of Mathematics. This also leads to study of related areas like Computer science, Financial Mathematics, Statistics and many more. Thus, this programme helps learners in building a solid foundation for higher studies in Mathematics. The skills and knowledge gained have intrinsic aesthetics leading to proficiency in analytical reasoning. This can be utilised in Mathematical modelling and solving real life problems.

Students completing this programme will be able to present Mathematics clearly and precisely, make abstract ideas precise by formulating them in the language of Mathematics, describe Mathematical ideas from multiple perspectives and explain fundamental concepts of Mathematics to non-Mathematicians.

Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

Programme Outcomes (POs)

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.Sc., MATHEMATICS WITH COMPUTER APPLICATION**
Programme Code:	
Duration:	**3 years [UG]**
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: 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 learning to real life situations. **PO5: 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. **PO6: Research-related skills**: A sense of inquiry and capability for

	asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team **PO8: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9: Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability toembrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstratingthe

	ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Under Graduate Programme

Programme Outcomes:

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

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

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

PO4: Analytical 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 analyse, interpret and draw conclusions from quantitative / qualitative data; 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.

B.Sc Mathematics with Computer Application

Programme Specific Outcomes:

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

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

PSO3: To 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.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)can be carried out accordingly, assigning the appropriate level in the grids:

	POs							PSOs		
	1	2	3	4	5	6	…	1	2	…
CLO1										
CLO2										
CLO3										
CLO4										

CLO5										

Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.

- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.
- **Value additions in the Revamped Curriculum:**

Semester	Newly introduced Components	Outcome / Benefits
I	**Foundation Course** To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning abstract Mathematics and simulating mathematical concepts to real world.	• Instil confidence among students • Create interest for the subject
I, II, III, IV	**Skill Enhancement papers** (Discipline centric / Generic / Entrepreneurial)	• Industry ready graduates • Skilled human resource • Students are equipped with essential skills to make them employable • Training on Computing / Computational skills enable the students gain knowledge and exposure

		on latest computational aspects
		• Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc.
		• Entrepreneurial skill training will provide an opportunity for independent livelihood • Generates self – employment • Create small scale entrepreneurs • Training to girls leads to women empowerment
		• Discipline centric skill will improve the Technical knowhow of solving real life problems using ICT tools
III, IV, V & VI	Elective papers- An open choice of topics categorized under Generic and Discipline Centric	• Strengthening the domain knowledge • Introducing the stakeholders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature • Students are exposed to Latest topics on Computer Science / IT, that require strong mathematical background • Emerging topics in higher education / industry / communication network / health sector etc. are introduced with hands-on-training, facilitates designing of mathematical models in the respective sectors
IV	Industrial Statistics	• Exposure to industry moulds students into solution providers • Generates Industry ready graduates • Employment opportunities enhanced
II year Vacation activity	Internship / Industrial Training	• Practical training at the Industry/ Banking Sector / Private/ Public sector organizations / Educational institutions, enable the students gain professional experience and also become responsible citizens.

V Semester	Project with Viva – voce	• Self-learning is enhanced • Application of the concept to real situation is conceived resulting in tangible outcome
VI Semester	Introduction of Professional Competency component	• Curriculum design accommodates all category of learners; 'Mathematics for Advanced Explain' component will comprise of advanced topics in Mathematics and allied fields, for those in the peer group / aspiring researchers; • 'Training for Competitive Examinations' –caters to the needs of the aspirants towards most sought - after services of the nation viz, UPSC, CDS, NDA, Banking Services, CAT, TNPSC group services, etc.
Extra Credits: **For Advanced Learners / Honours degree**		• To cater to the needs of peer learners / research aspirants

Skills acquired from the Courses	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

2. **Template for Curriculum Design for UG Programme in Mathematics**

Credit Distribution for UG Programme in Mathematics

B.Sc Mathematics with Computer Application

SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

Bachelor of Science (B.Sc) in Mathematics with Computer Application

Programme Pattern and Syllabus (CBCS)

(For Students Admitted in the College from the Academic Year 2024-2025 Onwards)

Sl. No.	Part	Nature of Course	Course Code	Name of the Course	Hours/ Week	Credits	Marks		
							CIA	ESE	Total
SEMESTER I									
1	I	Language	24UTA1F01	Tamil - I	6	3	25	75	100
2	II	Language	24UEN1F01	English – I	6	3	25	75	100
3	III	Core Course I	24UMC1C01	Algebra and Trigonometry	4	4	25	75	100
4		Core Course II	24UMC1C02	Calculus	4	4	25	75	100
5		Elective Course I	24UMC1E01	Web Designing with HTML	4	3	25	75	100
6		Practical	24UMC1P01	Web Designing with HTML	2	2	25	75	100
7	IV	Skill Enhancement Course (SEC-01) (Non Major Elective)	24UMC1N01	Mathematics For Competitive Examinations-I	2	2	25	75	100
8		Foundation Course	24UMC1FC01	Bridge Mathematics	2	2	25	75	100
Total					**30**	**23**	**200**	**600**	**800**
SEMESTER II									
9	I	Language	24UTA2F02	Tamil – II	6	3	25	75	100
10	II	Language	24UEN2F02	English – II	6	3	25	75	100
11		Core Course– III	24UMC2C03	AnalyticalGeometry& Vector Analysis	4	4	25	75	100
12		Core Course –	24UMC2C04	DifferentialEquati	4	4	25	75	100

	III	IV		onsandits Applications					
13		Elective Course II	24UMC2E02	Programmingwith Python	4	3	25	75	100
14		Practical	24UMC2P02	Programming with Python	2	2	25	75	100
15	IV	Skill Enhancement Course (SEC-02) (Non Major Elective)	24UMC2N02	Mathematics For Competitive Examinations-II	2	2	25	75	100
16		Skill Enhancement Course (SEC-03)	24UMC2S01	Sage Mathematics	2	2	25	75	100
Total					30	**23**	**200**	**600**	800

Sl. No.	**Part**	**Nature of Course**	**Course Code**	**Name of the Course**	**Hours/ Week**	**Credits**	**Marks**		
							CIA	**ESE**	**Total**
SEMESTER III									
17	I	Language	24UTA3F03	Tamil-III	6	3	25	75	100
18	II	Language	24UEN3F03	English-III	6	3	25	75	100
19	III	Core Course – V	24UMC3C05	FourierSeries &Integral Transforms	4	4	25	75	100
20		CoreCourse– VI	24UMC3C06	Java and Data Structures	4	3	25	75	100
21		Practical	24UMC3P03	Java and Data Structures	2	2	25	75	100

22		Elective Course III	24UMC3E03	Numerical Methods	4	4	25	75	100
23	IV	Skill Enhancement Course (Entrepreneurial Based)(SEC-04)	24UMC3S02	Computational Mathematics	1	1	25	75	100
24		Skill Enhancement Course(SEC-05)(Discipline/Subject Specific)	24UMC3S03	Advanced Excel	2	2	25	75	100
25		EVS	24UES401	Environmental Studies	1	-			
Total					**30**	**22**	**200**	**600**	**800**
SEMESTER IV									
26	I	Language	24UTA4F04	Tamil-IV	6	3	25	75	100
27	II	Language	24UEN4F04	English-IV	6	3	25	75	100
28	III	Core Course–VII	24UMC4C07	WebTechnology	4	3	25	75	100
29		Practical	24UMC4P04	WebTechnology	2	2	25	75	100
30		Core Course – VIII	24UMC4C08	Number Theory	4	4	25	75	100
31		Elective Course IV	24UMC4E04	Mathematical Statistics	4	4	25	75	100
32	IV	Skill Enhancement Course(SEC-06)	24UMC4S04	Mathematics For Competitive Examinations-III	2	2	25	75	100

33		Skill Enhancement Course(SEC-07)(Discipline/Subject Specific)	24UMC4S05	Statistics with R Programming	2	2	25	75	100
34		EVS	24UES401	Environmental Studies	1	2	25	75	100
Total					**30**	**25**	**225**	**675**	**900**

Sl. No.	**Part**	**Nature of Course**	**Course Code**	**Name of the Course**	**Hours/ Week**	**Credits**	**Marks**		
							CIA	**ESE**	**Total**
SEMESTER V									
35	III	Core Course – IX	24UMC5C09	ModernAlgebra	5	4	25	75	100
36		Core Course – X	24UMC5C10	Real Analysis	5	4	25	75	100
37		Core Course – XI	24UMC5C11	Mechanics	5	4	25	75	100
38		Core Course – XII	24UMC5C12	Project Viva Voce	4	4	25	75	100
39		Elective Course -V	24UMC5E05	Operations Research –I	4	3	25	75	100
40		Elective Course -VI	24UMC5E06	Artificial Intelligence &Machine Learning	3	3	25	75	100
41		Practical	24UMC5P05	Artificial Intelligence & Machine Learning	2	2	25	75	100
42	IV	Value Education	24UVE501	Value Education	2	2	25	75	100

				Yoga					
43		Internship	24UMC5IN01	Internship/IndustrialVisit/Field Visit	-	2			
Total					**30**	**28**	**200**	**600**	**800**
Sl. No.	**Part**	**Nature of Course**	**Course Code**	**Name of the Course**	**Hours/ Week**	**Credits**	**Marks**		
							CIA	**ESE**	**TOT**
SEMESTER VI									
44	III	Core Course – XIII	24UMC6C13	Linear Algebra	6	4	25	75	100
45	III	Core Course – XIV	24UMC6C14	Complex Analysis	6	4	25	75	100
46	III	Core Course – XV	24UMC6C15	Discrete Mathematic and Graph Theory	6	4	25	75	100
47	III	Elective Course -VII	24UMC6E07	Operations Research – II	5	3	25	75	100
48	III	Elective Course -VIII	23UMA6E08	Data Science	3	3	25	75	100
49	III	Practical	24UMC6P06	Data Science	2	2	25	75	100
44	**IV**	Professional Competency Skill	24UMC6PC01	LaTeX Practical	2	2	25	75	100
45		Extension Activity	24UEX601	Extension Activity	-	1			
Total					**30**	**23**	**175**	**525**	700

Total Credits: 144

Credit Distribution for UG Programme in Mathematics with Computer Application

Sem I	Credit	H	Sem II	Credit	H	Sem III	Credit	H	Sem IV	Credit	H	Sem V	Credit	H	Sem VI	Credit	H
Part 1. Language – Tamil	3	6	Part.. 1. Language – Tamil	3	6	Part..1. Language – Tamil	3	6	Part.. 1. Language – Tamil	3	6	5.1 Core Course – \CC IX	4	5	6.1 Core Course – CC XIII	4	6
Part. 2 English	3	6	Part.. 2 English	3	6	Part..2 English	3	6	Part.. 2 English	3	6	5.2 Core Course – CC X	4	5	6.2 Core Course – CC XIV	4	6
1.3 Core Course – CC I	5	5	2..3 Core Course – CC III	5	5	3.3 Core Course – CC V	5	5	4.3 Core Course – CC VII	5	5	5. 3.Core Course CC	4	5	6.3 Core Course – CC XV	4	6

									Core Industry Module			-XI					
1.4 Core Course – CC II	5	5	2.4 Core Course – CC IV	5	5	3.4 Core Course – CC VI	5	5	4.4 Core Course – CC VIII	5	5	5. 4.Core Course –/ Project with viva-voce CC - XII	4	5	6.4 Elective - VII Generic/ Discipline Specific	3	5
1.5 Elective I Generic/ Discipline Specific	3	4	2.5 Elective II Generic/ Discipline Specific	3	4	3.5 Elective III Generic/ Discipline Specific	3	4	4.5 Elective IV Generic/ Discipline Specific	3	3	5.5 Elective V Generic / Discipline	3	4	6.5 Elective VIII Generic/ Discipline	3	5

												Specific			Specific		
1.6 Skill Enhancement Course SEC-1	2	2	2.6 Skill Enhancement Course SEC-2	2	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	1	4.6 Skill Enhancement Course SEC-6	2	2	5.6 Elective VI Generic / Discipline Specific	3	4	6.6 Extension Activity	1	-
1.7 Skill Enhancement - (Foundation Course)	2	2	2.7 Skill Enhancement Course – SEC-3	2	2	3.7 Skill Enhancement Course SEC-5	2	2	4.7 Skill Enhancement Course SEC-7	2	2	5.7 Value Education	2	2	6.7 Professional Competency Skill	2	2
						3.8 E.V.S.	-	1	4.8 E.V.S	2	1	5.8 Summer Inte	2				

											rns hip /Ind ustr ial Trai nin g					
	23	**30**		**23**	**30**		**22**	**30**		**25**	**30**		**26**	**30**		**21**	**30**
Total – 140 Credits																	

5. Consolidated Semester wise and Component wise Credit distribution

Parts	**Sem I**	**Sem II**	**Sem III**	**Sem IV**	**Sem V**	**Sem VI**	**Total Credits**
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	24	20	96
Part IV	4	4	3	6	4	1	22
Part V	-	-	-	-	-	2	2
Total	23	23	22	25	28	23	**144**

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

Elective Course for the I year B. Sc Mathematics with Computer Application:

Name Name of the course	**Paper Code**
Web DesigningwithHTML(With Lab)	24UMC1E01
ProgrammingwithPython (with Lab)	24UMC2E02

Elective Course for the II year B. Sc Mathematics with Computer Application:

Name Name of the course	Paper Code
NumericalMethods	24UMC3E03
Mathematical Statistics	24UMC4E04

Elective Course for the III year B. Sc Mathematics with Computer Application:

Name Name of the course	Paper Code
OperationsResearch –I	24UMC5E05
ArtificialIntelligence & Machine Learning(with Lab)	24UMC5E06
OperationsResearch –II	24UMC6E07
DataScience(with Lab)	23UMA6E08

Non Major Elective Course for other Departments: (Other than Mathematics CA)

Name Name of the course	Paper Code
Mathematics For Competitive Examinations-I	24UMC1N01
Mathematics For Competitive Examinations-II	24UMC2N02

B.Sc Mathematics with Computer Application

Core Component Model Syllabus

Note

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

SWAYAM –Study Webs of Active-Learning for Young Aspiring Minds

NPTEL –National Programme on Technology Enhanced Learning

List of Extension Activities

1. National Cade Corps (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)

5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)

PROGRAMME SYLLABUS

Program: B.Sc Mathematics with Computer Application				
Foundation Course	**Course Code:** 24UMC1FC01		Foundation course - BRIDGE MATHEMATICS	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	2	30	2	100

Course Objectives

- To bridge the gap and facilitate transition from higher secondary to tertiary education;
- To instil confidence among stakeholders and inculcate interest for Mathematics;

UNIT-I:

Algebra: Binomial theorem, General term, middle term, problems based on these concepts

Unit II:

Sequences and series (Progressions).Fundamental principle of counting.Factorial n.

Unit III:

Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.

Unit IV:

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

Unit V:

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

Text Books:

1. NCERT class XI and XII text books.
2. Any State Board Mathematics text books of class XI and XII

Website and e-Learning Source	https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge 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	Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations..	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 of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	POs						PSOs	
	1	2	3	4	5	6	1	2
CLO1	1	1	1	1	1	1	1	1
CLO2	2	1	1	2	2	1	2	1
CLO3	2	1	1	2	2	1	2	1
CLO4	1	1	1	1	1	1	2	1
CLO5	1	1	1	1	1	1	2	1

Program: B.Sc Mathematics with Computer Application				
Core Course – I	**Course Code:**24UMC1C01		**Course Title**: ALGEBRA AND TRIGONOMETRY	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	4	60	4	100

Course Objectives

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

Unit I:

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: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:

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

Unit IV:

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

Text Book

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., PearsonEducation, Delhi, 2005
4. C.V.Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003
5. J.Stewart,L.Redlin,andS.Watson,AlgebraTrigonometry, Cengage Learning, 2012.

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

E-Learning Source https://nptel.ac.in

Outcomes (COs)

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

CO Number	CO Statement	Knowledge 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	K2& K3
CO4	Expand the powers and multiples of trigonometric functions in terms of sine and cosine	K4&K5
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 of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

Program: B.Sc Mathematics with Computer Application				
Core Course – II	**Course Code:**24UMC1C02		Course Title: CALCULUS	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	4	60	4	100

Course Objectives

- The basic skills of differentiation, successive differentiation, and their applications.
- Basic knowledge on the notions of curvature,evolutes,involutes and polar co-ordinates and in solving related problems.
- Knowledge on integration and its geometrical applications,double, triple integrals and improper integrals.
- Knowledge about Beta and Gamma functions and their applications.

UNIT-I: Successive Differentiation-n^{th}derivative,Standard results Leibnitz Theorem (without Proof) and its applications.Relatedproblems (Book I-Chapter3:Sections 1.1 to1.6 and 2.1.)

UNIT-II: Envelopes- Methods of finding envelopes- Curvature–Circle, radius, Centre of Curvature – Involutes -Evolutes-Cartesian and Polar formula for the radius of curvature. Co-ordinates of Centre of Curvature Maxima and Minima functions of two variables,- Jacobians. Related problems.(Book I– Chapter10: Sections1.1 to 1.4; 2.1 to2.6. Book III-Chapter3: Section 3 and 4.)

UNIT-III: Integral Calculus**:**Reductionformulae:Bernoulli'sformula,$\int e^{ax}\cos bx\,dx$,$\int e^{ax}\sin bx\,dx$-$\int \sin^m x\cos^n x\,dx$(m,n being positiveintegers),$\int x^m(\log x)^n dx$,$\int \cos^m x\cos nx\,dx$,$\int \cos^m x\sin nx\,dx$ (Book III- Chapter 11)

UNIT-IV: Double Integrals (Cartesian co-ordinates only), Multiple Integrals - definition of double integrals - evaluation of double integrals- Change of order of integration. Triple integrals(Cartesian co-ordinates only).
(BookII–Chapter 5:Sections1, 2.1,2.2&4.)

UNIT-V: Beta and Gamma functions (Applications to simple problems)

(BookIII– Chapter 13.)

Text Book

1. "Calculus",Vol-I,S.Narayanan and T.K.Manicavachagam Pillai S.Viswanathan publishers–2007.
2. "Calculus",Vol-II,S.Narayanan and T.K.Manicavachagam Pillai S.Viswanathan publishers–2007.
3. Calculus,Dr.PRVittal and Dr.VMalini,Margham publications,Reprint2016.

Reference Books

1. R.CourantandF.John,IntroductiontoCalculusandAnalysis (Volumes I & II), Springer-Verlag, New York, Inc., 1989.
2. T.Apostol,Calculus, VolumesIandII.
3. S.Goldberg,Calculusandmathematicalanalysis.
4. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
5. G.B.ThomasandR.L.Finney,Calculus,PearsonEducation,2010.
6. D.Chatterjee,IntegralCalculusandDifferentialEquations,Tata- McGraw Hill Publishing Company Ltd.

E–Learning Sources https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	EvaluatethenthderivativeusingLeibnitz Rule	K1
CO2	Compute Radius and circle of curvature,Evolute and Maxima–Minima of two variables.	K1&K2
CO3	Evaluate integral values by appropriate reduction formula.	K2& K3
CO4	Identify the multiple integral techniques and Evaluate.	K4&K5
CO5	Evaluate the indefinite integrals using the properties of Beta and Gamma functions	K5

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	1	1	1	3	2	1
CLO2	3	1	3	1	1	-	3	2	1
CLO3	3	2	3	2	-	1	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	-	-	3	2	1

Program: B.Sc Mathematics with Computer Application				
Elective Course – I	**Course Code:**24UMC1E01		WEB DESIGNING WITH HTML	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	04	60	3	100

Course Objectives

- Insert a graphic with in a webpage.
- Create a link within a web page.
- Create a table with in a web page.
- Insert heading levels with in a web page.
- Insert ordered and unordered lists within a web page. Create a web page.

UNIT-I:Introduction to HTML – Opening for writing HTML – Unicode Transformation Format – HTML 5 Resources – What is different in HTML 5? - <DOCTYPE> in HTML 5 (Chapter1: Sec1.1 to 1.5, Chapter2: Sec2.1 to 2.3)

UNIT-II:DesigningaWebpage

DesignConsiderationsand Planning – Basic Tags and Document structure– HTMLTags<HTML>…</HTML>-HeadTags<HEAD>…</HEAD>-TitleTags–Body Tags

<BODY> … </BODY> - Metadata – Saving an HTML document – Actions. (Chapter 3: Sec 3.1 to 3.8)

UNIT-III:Formatting

Page Formatting – Adding a New Paragraph – Adding a Line Break – Inserting Blank Space – Preformatted Text – Changing a Page's Background Color – Div Element - Text items and objects – Headings – Comments – Block Quotes – Horizontal Lines – Special Characters – Creating Lists – Numbered (Ordered) Lists – Bulleted (Unordered) Lists – Nested Lists- Definition Lists.(Chapter4: Sec4.1 to 46)

UNIT-IV:Links

Introduction to Links – Text Links – Image Links – Opening a web page in a new window/Tab – Setting All Links on apage to open in a new window/Tab – Linking to an area on the same page(Bookmarks)–LinkingtoanE-mailAddress–Linkingtoother typesofFiles. (Chapter 7:Sec7.1 to 7.8)

UNIT-V:Images

Introduction to Images: Adding Images – Resizing images – Alternative (ALT) Text – Image Labels. Tables:Introduction to Tables - Inserting a Table – Table Borders - Table Headers.(Chapter8: 8.1 to 8.5,Chapter9: 9.1 to 9.3)

T**ext Books:**

1. "Mastering HTML5 and CSS3 Made Easy",Teach U Comp Inc., 2014.
2. Thomas Michaud," Foundations of Web Design: Introduction to HTML&CSS"

E-**learning Sources**

1. https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2. https://www.w3schools.com/html/default.asp

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understandthebasicconceptin HTML.Conceptofresources in HTML	K1

CO2	Create the Meta Data,Design concept & save the files	K2
CO3	Understand page formatting andtheconceptof list.	K2& K3
CO4	CreatingLinksandunderstandtheconceptofcreatinglinktoemailaddress	K4
CO5	Create concepts by adding images.Understand the table creation	K5

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	-	3	2	2	2	2
CLO2	3	2	1	-	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	-	3	2	2	2	2
CLO5	3	2	1	-	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
Practical	**Course Code:**24UMC1P01	WEB DESIGNING WITH HTML		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	2	30	2	100

Course Objectives

- Insert a graphic with in a webpage.
- Create al ink within aweb page.
- Create a table with in a web page.
- Insert heading levels with in a web page.
- Insert ordered and unordered lists within a web page. Create a web page.

Practical Course Outline:

1. Write a program to illustrating the basic tags of HTML.
2. Write a program on Page formatting.
3. Write a program to illustrate paragraph tag.
4. Write a program to change background colour.
5. Write a program to create a list(Numbered(Ordered)Lists– Bulleted (Unordered) Lists).
6. To create a HTML file using special characters.
7. To create a HTMLfile containing hyper link.
8. Write a HTML program to display a table with 5 rows and 4 columns with appropriate heading.
9. Write a HTML code to design complexnested list.
10. Write a HTML code to develop a web page having two frames that divide the page into two equal rows and divide the first row into two columns.

Text Books:

1. "Mastering HTML5 and CSS3 Made Easy",TeachUComp Inc., 2014.
2.Thomas Michaud,"FoundationsofWebDesign:Introduction to HTML&CSS"

E-learning Sources

1.https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2.https://www.w3schools.com/html/default.asp

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concept in HTML.Concept of resources in HTML	K1
CO2	Create the Meta Data,Designconcept&savethefiles	K2
CO3	Understand page formatting and the concept of list.	K2& K3
CO4	Creating Links and understand the concept of creating link to email address	K4
CO5	Create concepts by adding images.Understand the table creation	K5

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	-	3	2	2	2	2
CLO2	3	2	1	-	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	-	3	2	2	2	2
CLO5	3	2	1	-	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
SkillEnhancementCourse SEC-01 **(NonMajorElective)**	**Course Code:**24UMC1N01		**Course Title:** MATHEMATICS FOR COMPETITIVE EXAMINATION–I	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	2	30	2	100

Course Objectives

- Remembering the meaning of HCF and LCM of numbers.
- Understanding the concept of percentage on simple problems.
- Analyzing the concepts of ratio and proportion.

UNIT– I:

Numbers-H.C.FandL.C.M.ofNumbers. (Chapter – 1 &2)

UNIT-II:

Decimal Fractions–Simplification. (Chapter – 3 & 4)

UNIT-III:

Square Roots and Cube Roots–Average. (Chapter – 5 & 6)

UNIT-IV:

Problems on Numbers-Problemson Ages. (Chapter – 7 & 8)

UNIT-V:

Surds & Indices–Percentage. (Chapter – 9 & 10)

Text Books

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

ReferenceBooks:

1. Quantitative Aptitude‘’byAbhijit Guha,Tata McGraw Hill Publishing Company Limited, New Delhi (2005)

E-learning Sources https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Perform basic mathematics in Numbers.	K1
CO2	Understand Decimal Fractions and Simplification	K2
CO3	Develop basic concept of SquareRoots and CubeRoots and Average.	K3
CO4	Explain Problems on Numbers-Problems on Ages.	K4
CO5	Critique and evaluate quantitative arguments that utilize mathematics,statistical and quantitative informations	K5

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

Program: B.Sc Mathematics with Computer Application				
Core Course –III	**Course Code:**24UMC2C03	Course Title : ANALYTICAL GEOMETRY & VECTOR ANALYSIS		
Semester II	**Hours/Week** 4	**Total Hours** 60	**Credits** 4	**Total Marks** 100

Course Objectives

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

UNIT-I:

System of Planes-Length of the perpendicular-Orthogonal projection.(Book1-Chapter2:Sections 2.5,2.7,2.9)

UNIT-II:

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.(Book1-Chapter3: Sections 3.1, 3.2,3.4, 3.6, 3.7, 3.8)

UNIT-III:

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.(Book1-Chapter6: Sections 6.1, 6.2,6.3, 6.4, 6.6, 6.7, 6.8)

UNIT-IV:

Vector Differentiation**:** Directional Derivative - Gradient- Unit normal to the surface - Equation of tangent plane to a surface - Equation of normaltoasurface–Divergence–Curl–Laplacian Differential operators.(Book2 – Chapter2.)

UNIT-V:

Vector Integration: Evaluation of line integral - surface integral and volume integrals.Application of Green's theorem - Gauss-Divergence theorem – Stokes theorem (proofs of theorems not included)-simple problems.(Book2-Chapter3: Section3.1 to3.6 and3.8;Chapter4.)

Text Book

1. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr.P.K.Mittal - S.Chand & Co.Pvt.Ltd.
2. Vector Analysis by P.Duraipandian and Kayalal Pachaiyappa,S.Chand.

Reference Books

1. S.L.Loney,Co-ordinate Geometry.
2. RobertJ.T.Bell,Co-ordinateGeometryofThreeDimensions.
3. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.
4. Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961.
5. Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010.
6. William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006.
7. John F. Randelph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969.
8. 8. Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962.

E-learning Sources :https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Solve problems in the system ofPlanes	K1

CO2	Estimatetheanglebetweenthelineandplane,coplanarlinesand shortestdistance between skew lines.	K2
CO3	Understandtheconceptof equation ofsphereandits applications.	K3& K4
CO4	CalculateDirectional Derivative,DivergenceandCurl.	K4 &K5
CO5	ApplyGreen'stheorem,Gauss-Divergencetheorem,Stoke'stheoremtoevaluateArea and Volume	K5

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	2	2	1	1	1	3	2	1
CLO2	2	3	2	1	1	1	3	2	1
CLO3	3	3	2	1	1	1	3	2	1
CLO4	3	3	3	2	1	1	3	2	1
CLO5	3	3	3	2	1	1	3	2	1

Program: B.Sc Mathematics with Computer Application				
Core Course –IV	**Course Code:**24UMC2C04	**Course Title :** DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	4	60	4	100

Course Objectives

- Knowledge about the methods of solving Ordinary and Partial Differential Equations.

- The understanding of how Differential Equations can be used as a powerful tool in solving problems in science.

UNIT-I:

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

UNIT-II:

Equation of first order but not of higher degree: Equation solvable for dy/dx-Equation solvable for y-Equation solvable for x- Clairauts' form - Linear Equations with constant coefficients-Particular integrals of algebraic, exponential, trigonometric functions and their products. (Chapter4: Sections 1,2 ,3 and Chapter5: 1 to 4)

UNIT-III:

Simultaneous linear differential equations- Linear Equations of the Second Order - Complete solution in terms of a 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: 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 – Standard forms-Charpit's Methods – Simple Applications (Chapter12: 5 and 6)

Text Book:

1. Shepley L.Ross, Differential Equations,3rdEd.,John WileyandSons, 1984.
2. I.Sneddon,Elements of Partial Differential Equations,McGraw-Hill,International Edition, 1967.
3. S.Narayanan & T.K.Manicavachagam Pillay, Calculus Vol III, Vishwanathan Printers and publishers pvt.ltd, Chennai(2016).

Reference Books:

1. D.A.Murray,Introductory course in Differential Equations,Orient and Longman
2. H.T.H.Piaggio,Elementary Treaties on Differential Equations and their applications,

C.B.S Publisher & Distributors, Delhi,1985.

3. HorstR.Beyer,Calculus andAnalysis,Wiley,2010.
4. Braun,M.DifferentialEquationsandtheirApplications.(3rdEdn.),Springer- Verlag, New York. 1983.
5. TynMyint-U and Lognath Debnath. Linear Partial Differential Equations for Scientists and Engineers. (4th Edn.) Birhauser, Berlin. 2007.
6. N.P.Bali,DifferentialEquations,FirewallMediaPublications,(2006).
7. S.Narayanan, Differential Equations and its Applications, DhivyaSubramanian for Anand Book Depot(2017).

E-learning Sourceshttps://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge 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& K4
CO4	Form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations	K4 &K5
CO5	Explain standard forms and Solve Differential equations using Charpit's method	K5

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	2	3	2	2	2	3	3	2
CLO2	2	2	3	2	2	2	3	3	2
CLO3	2	3	3	3	2	3	3	3	2
CLO4	2	3	3	3	2	3	3	3	2
CLO5	2	3	3	3	2	2	3	2	2

Program: B.Sc Mathematics with Computer Application				
Elective Course– II	**Course Code:**24UMC2E02	**Course Title :** PROGRAMMING WITH PYTHON		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	4	60	3	100

Course Objectives

- Describe the core syntax and semantics of Python programming language.
- Discover the need forworking with the strings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- Understand the usage of packages and Dictionaries.
- To know the costs and profit maximization

UNIT-I:

Introduction to Python–Origins–Features–Downloading and Installing Python–Running Python – Python Documentation. Getting Started – Program Output statement – Program Input function – Python Basics – Statements and syntax –Variable Assignment – Identifiers – Numbers – Introduction – Integers – Double Precision Floating Point Numbers – Complex Numbers – Operators – Built-in functions for all numeric

types.(Chapter1:Sec1.1to1.8,Chapter2:Sec2.1 to 2.6,Chapter3Sec3.1 to 3.6,Chapter5Sec5.1 to 5.6)

UNIT-II:

Sequences: Strings, Lists and Tuples – Sequences – Strings – Strings and Operators–String-Only Operators–Built-in Functions– StringBuilt-inMethod–Lists–Operators-Built-inFunctions–ListType Built-in Methods–Tuples—Tuple Operators and Built-in Functions.(Chapter6 Sec6.1 to 6.19)

UNIT-III:

ConditionalsandLoops–Ifstatement–elsestatement–elif statement–Conditional expressions–while statement–for statement– break statement–Continue statement–pass statement –Functions and Functional Programming–Calling Functions–Creating Functions–Passing Functions–Formal Arguments-Variable-Length Arguments.(Chapter6 Sec6.1 to 6.19)

UNIT-IV:

Errors and Exceptions – Exceptions in Python – Detecting and Handling Exceptions Context Management – with statement – Raising Exceptions – Modules – Modules and Files – Name spaces – ImportingModules–FeaturesofModule-Import–ModuleBuilt-inFunctions–Packages.(Chapter10 Sec10.1to 10.13)

UNIT-V:

Files and Input / Output: File Objects – File Built-in Functions – File Built-in Methods – File Built-in Attributes – Command-Line Arguments - File System –Object-oriented Programming–Introduction–Classes–ClassAttributes–Instances–InstanceAttributes.(Chapter9 Sec9.1 to 9.10)

Text Book

1. WesleyJ.Chun,"Core Python Programming",2nd Edition,Pearson Education LPE, New Delhi,2007.

Reference Books:

1. Mark Summerfield, Programming in Python 3,PearsonEducationLPE,NewDelhi,1996.
2. PythonProgramming,Braindraper,kindleunlimitedpvt.ltd.
3. CorePythonProgramming,Dr.R.NageswaraRao,dreamtechpvtltd. Kindle.

4. ThecompletereferenceonPython,Martin.C.BrownMAC GrawHillpvt.ltd.
5. CodingforbeginnersusingPython.LouieStowell,kindle publishing pvt.ltd.

E-learning Sources:

1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Develop and executesimplePython programs	K1
CO2	WritesimplePython programsusing conditionalsandlooping forsolving problems.	K2
CO3	DecomposeaPythonprogramintofunctions.	K3& K4
CO4	RepresentcompounddatausingPythonlists,tuples,dictionariesetc.	K4 &K5
CO5	Readand writedatafrom/to filesin Python programs.	K5

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

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
Practical	**Course Code:**24UMC2P02	**Course Title :** PROGRAMMING WITH PYTHON		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	2	30	2	100

Course Objectives

- Describe the core syntax and semantics of Python programming language.
- Discover the need forworking with thestrings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- Understand the usage of packages and Dictionaries.
- To know the costs and profit maximization

Practical Course Outline:

1. Program for Systemconfiguration
2. Working with Strings
3. Working with Lists
4. Working with Tuples
5. Working with Dictionary
6. Working with conditional loops–if,else,elif
7. Working with conditional expressions for,while,break,continue
8. Implement in gprograms on functions
9. Working with function–formal arguments and variable- length arguments
10. Working with Detecting and Handling Exception
11. Working with modules.
12. Working with Built-inFunctions

Text Book

1. WesleyJ.Chun,"Core Python Programming",2nd Edition,Pearson Education LPE, New Delhi,2007.

Reference Books:

1. Mark Summerfield, Programming in Python PearsonEducationLPE,NewDelhi,1996.
2. Python Programming,Braindraper,kindleunlimitedpvt.ltd.
3. Core Python Programming,Dr.R.NageswaraRao,dreamtechpvtltd. Kindle.
4. The complete reference on Python,Martin.C.BrownMAC GrawHillpvt.ltd.
5. Coding for beginners usingP ython.LouieStowell,kindle publishing pvt.ltd.

E-learning Sources:

1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Develop and executesimplePython programs	K1
CO2	Write simple Python programs using conditionals and looping for solving problems.	K2
CO3	Decompose a Python program into functions.	K3& K4
CO4	RepresentcompounddatausingPythonlists,tuples,dictionariesetc.	K4 &K5
CO5	Readand writedatafrom/to filesin Python programs.	K5

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

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
SkillEnhancementCourseSEC-02 **(NonMajorElective)**	**Course Code:**24UMC2N02	**CourseTitle**: MATHEMATICS FOR COMPETITIVE EXAMINATION–II		
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	2	30	2	100

Course Objectives

- Understanding the concepts of chain rule.
- Applying the concept of time and distance.
- Analyzing the problem on trains with solved examples.

UNIT-I:

Profit & Loss–Ratio & Proportion. (Chapter – 11 & 12)

UNIT-II:

Partnership–Chain Rule. (Chapter – 13 & 14)

UNIT-III:

Time & Work–Pipes & Cistern. (Chapter – 15 &16)

UNIT-IV:

Time & Distance–Problems on Trains. (Chatper – 17 &18)

UNIT-V:

Boats & Streams–Alligation or Mixture. (Chatper – 19 &20)

Text Books

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

ReferenceBooks

1. Quantitative Aptitude‘’byAbhijit Guha,Tata McGraw Hill Publishing Company Limited, New Delhi (2005)

E-learning Sourceshttps://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Explainin detail aboutProfit & Lossand Ratio &Proportion.	K1 & K2
CO2	ExplainPartnershipand Chain Rule.	K3
CO3	Explain Time &Work andPipes &Cistern.	K3 & K4
CO4	ExplainTime& DistanceandProblems on Trains.	K5
CO5	ExplainBoats &Streamsand Alligationor Mixture.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

Program: B.Sc Mathematics with Computer Application				
SkillEnhancementCourse SEC-03	**Course Code:**24UMC2S01		**Course Title :** SAGE MATHEMATICS	
Semester II	**Hours/Week** 2	**Total Hours** 30	**Credits** 2	**Total Marks** 100

Course Objectives

To bridge the gap and facilitate transition from higher secondary to tertiary education;

To instil confidence among stake holders and in culcate interest forMathematics;

UNIT-I:

Using Sage Math as a Calculator: First Sage Math Examples- Computations- Basic Arithmetic Operators- Decimals Versus Exact Values- Constants.(Chapter2.1, Chapter2.2 upto Section2.2.3)

UNIT-II:

Breaking Long Lines of Code- Comments- Library Functions- Working with Strings- Solving Equations and Inequalities- Calculus Functions.(Chapter2.2fromSection2.2.4toSection2.2.9)

UNIT-III:

Graphs:2DGraphs-3DGraphs.(Chapter2.3)

UNIT-IV:

Introduction to Programming in Sage: Variables- More on Operators- Making Decisions- Boolean Expressions - If Statements- Loops- For Loops- Strings- While Loops- Nested Loops- Lists.(Chapter3.1 to 3.4)

UNIT-V:

Functions: Using Library Functions: Random, SciPy, NumPy- Application to Elementary Statistics: Mean, Median, Histograms, and Bar Charts.(Chapter3.5,Chapter3.9)

Text Books

1. Razvan A.Mezei,"An Introduction to Sage Programming" John Wiley & Sons,

USA, 2016.

ReferenceBooks

1. http://doc.sagemath.org/pdf/en/tutorial/SageTutorial.pdf
2. GregoryV.Bard.SageforUndergraduates,AmericanMathematicalSociety, availableonlineathttp://www.gregorybard.com/Sage.html
3. TheSageMathCloud,https://cloud.sagemath.com/.
4. https://nptel.ac.in/courses/111106149

E-learning Sourceshttps://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	To solve simple mathematical problems involving arithmetic operations using Sage.	K1 & K2
CO2	To solve equations and inequalities using Sage	K3
CO3	Plot2Dand3DgraphsusingSage.	K3 & K4
CO4	ApplyBooleanexpressionandcontrolstructurestosolvemathematicallproblems.	K5
CO5	Apply functions to compute statistical parameters and make charts	K6

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

Mapping of COs with POs

	POs	PSOs

	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	2	3	2	2	2	1
CLO2	2	3	3	2	3	2	1	2	2
CLO3	2	2	3	1	2	2	3	3	1
CLO4	1	3	3	2	2	2	2	3	2
CLO5	2	2	3	1	2	2	3	3	2

Program: B.Sc Mathematics with Computer Application				
Core Course – V	**Course Code:** 24UMC3C05		**Course Title :** FOURIER SERIES AND INTEGRAL TRANSFORM	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	4	75	4	100

Course Objectives

- To analyse Fourier series and its applicability
- To underst and Laplace Transform
- To apply Laplace transform to solve differential equations
- To compute Fourier Transform
- To apply Z Transforms to difference equations.

UNIT-I:

Fourier series- Expansion of periodic functions of period 2π- Expansion of even and odd functions, Half range Fourier series – Problems.(Book1-Chapter6: Section 1 to 4).

UNIT-II:

TheLaplaceTransforms-Definitions-Sufficientconditionsfor the existence of the Laplace transform (without proof)-Laplace transform of periodic functions-some general theorems-evaluation of integrals using Laplace transform.(Book1-Chapter5: Section 1.1,1.2, 3, 4, 5).

UNIT-III:

TheinverseLaplaceTransforms-ApplicationsofLaplace Transformsto ordinary differentialequations with constant co- efficients and variable co-efficients,

simultaneous equations and equations involvingintegrals-simple Problems.(Book1-Chapter5: Section 6,7, 8, 9, 10, 12)

UNIT-IV:

Fourier Transform- Infinite Fourier Transform (Complex form)–PropertiesofFourierTransform–FouriercosineandFourier sine Transform – Properties – simple Problems.(Book1-Chapter6: Section 9 to 12)

UNIT-V:

ZTransforms:DefinitionofZ-Transformanditsproperties- Z-Transforms of some basic functions- Formation of difference equations – Solution of difference equations using Z – transform-Examplesandsimpleproblems(Book2-Chapter7:Section7.1to 7.5).

Text Book

1. Calculus-VolumeIII"–S.Narayanan and T.K.ManicavachagamPillai.
2. "Engineering Mathematics for Semester III- Third Edition – T.Veerarajan(TataMcGraw-HillPublishingCompanyLtd,NewDelhi)(forUnit-V).

Reference Books

1. EngineeringMathematicsVolumeIII–P.Kandasamyandothers(S.ChandandCo.)
2. AdvancedEngineeringMathematics-StanleyGrossmanandWilliam R.Devit.
3. EngineeringMathematicsIII-A.Singaravelu,MeenakshiAgency,Chennai,2008

E-learning Sources https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	StudytheexpansionofperiodicfunctionsusingFourier Series	K1 & K2
CO2	AnalyseLaplacetransformandtheconditionsofexistenceofLaplacetransform	K2 & K3
CO3	ImplementtheLaplacetransformtechniquetosolvedifferential equations.	K3 & K4
CO4	Demonstratethe Fouriertransformanditsproperties	K5
CO5	ApplyZtransform fordifferenceequations	K6

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	1	2	3	2	1
CLO2	3	3	3	2	1	2	3	2	1
CLO3	3	2	3	2	1	2	3	3	1
CLO4	3	2	3	2	1	2	3	2	1
CLO5	3	2	3	2	1	2	3	2	1

Program: B.Sc Mathematics with Computer Application				
Core Course – VI	**Course Code:**24UMC3C06		**Course Title:**JAVA AND DATA STRUCTURE	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	4	60	3	100

Course Objectives

- Learn the basic concepts of Java programming
- Use class and objects to create applications
- Over view the concepts of interfaces, packages, multi threading and exceptions.
- Familiarize the concepts of basic data structures and their use in algorithms.

UNIT-I:

History and Evolution of Java-Features of Java-Overview of Java Language Data Types–Variables-Type Conversion and Casting-Operators– ArithmeticOperators-Bitwise–RelationalOperators-Assignment Operator –The conditional Operator–Operator Precedence.(Book1:Chapter2:Sec2.1to2.10,Chapter3:Sec3.1to3.12,Chapter4: Sec4.1to4.4.12,Chapter5:Sec5.1to 5.16)

UNIT-II:

Control Statements–Arrays.-Classes-Objects-Constructors- Overloading method –String Class-Overriding.(Book1:Chapter6:Sec6.1to6.9)

UNIT-III:

Packages-Exception Handling- Throw and Throws-The Java ThreadModel-CreatingaThread and Multiple Threads–Thread Priorities Synchronization-Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads – Multithreading-Applets Programming.(Book1:Chapter11:Sec11.1to11.11,Chapter12:Sec12.1to12.11).

UNIT – IV:

DataStructures:Definition of a Data structure–Arrays,Operations on Arrays, Orderlists. Stacks – Operations on stack -Applications of Stack - Infix to Postfix Conversion – Evaluation of post fix expression;Recursion.Queues-CircularQueue–OperationsonQueues,QueueApplications.(Book2:Chapter6:Sec6.1to6.11,Chapter7:Sec7.1to7.7,Chapter8:Section8.1to8.12).

UNIT-V:

Linked List–Representation of Linked List in memory–Insertion and Deletion from Linked List.(Book2:Chapter5:Section5.1to5.10)

Text Book

1. E.Balagurusamy,Programming with Java, Sixth edition,Tata- McGraw-hill Publishingco.Ltd.
2. Seymour Lipschutz Data Structures, Edition 2006, Tata McGraw hill Publications

Reference Books

1. Herbert Schildt,The Complete Reference Java 5th edition,Tata- McGraw-hill pubishingco.ltd
2. Y.Daniel ziang, An Introduction to Java Programming,Prentice Hall of India Pvt. Ltd.
3. TusharB.Kute,CoreJavaProgrammingAPractical Approach
4. L.MathuKrithigaVenkatesh,DataStructuresandAlgorithms MarghamPublications.
5. R.KruseC.L.TondoandB.Leung,1997,DataStructuresand Program designin C,PHI.

E-Learning Source

- https://howtodoinjava.com
- https://www.programiz.com/java-programming
- https://www.theserverside.com/javaprogramming
- https://www.technopedia.com/java
- https://www.hackerearth.com/practice/algorithms/graphs/graph-representation/tutorial/

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Explainthebasicconceptsofobjectoriented programmingandenablestudentsto understand about introduction of Java programming.	K1
CO2	Discussaboutdecisionmakingstatementslikeif,if-else,elseifladderetc.Usethe concept of decision making and looping, classes, objects, methods, and strings to develop programs.	K2
CO3	Analyzeandtounderstandtheconceptsofinterfacesinheritanceandpackages.Explain and develop programs in applet Programming, Managing errors and Exceptions.	K2& K3
CO4	Identify thedataandapply thesuitableconceptsof datastructurein programming.	K4&K5
CO5	Demonstratelinkedlist anditsoperationsfor programming.	K5

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2

CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
Practical	**Course Code:**24UMC3P03		**Course Title:**JAVA AND DATA STRUCTURE	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	2	30	2	100

Course Objectives

- Learn the basic concepts of Java programming
- Use class and objects to create applications
- Overview the concepts of interfaces ,packages,multi threading and exceptions.
- Familiarize the concepts of basic data structures and their use in algorithms.

Practical Course Outline:

1. Classes and objects
2. Arrays
3. Multi threading
4. Exception handling
5. Inheritance
6. Applet programming
7. Linked Lis t(Stacks and Queues)

Two or three programs under each heading

Text Book

1. E.Balagurusamy,Programming with Java,Sixth edition,Tata- McGraw-hill Publishingco.Ltd.
2. Seymour Lipschutz Data Structures,Edition2006,Tata McGraw hill Publications

Reference Books

1. Herbert Schildt, The Complete Reference Java 5th edition, Tata-McGraw-hill pubishing co.ltd

2. Y.Danielziang,An Introduction to Java Programming, Prentice Hall of India Pvt. Ltd.
3. TusharB.Kute,Core Java Programming A Practical Approach
4. L.MathuKrithigaVenkatesh,DataStructuresandAlgorithms MarghamPublications.
5. R.KruseC.L.TondoandB.Leung,1997,DataStructuresand Program designin C,PHI.

E-Learning Source

- https://howtodoinjava.com
- https://www.programiz.com/java-programming
- https://www.theserverside.com/javaprogramming
- https://www.technopedia.com/java
- https://www.hackerearth.com/practice/algorithms/graphs/graph-representation/tutorial/

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Explainthebasicconceptsofobjectoriented programmingandenablestudentsto understand about introduction of Java programming.	K1
CO2	Discussaboutdecisionmakingstatementslikeif,if-else,elseifladderetc.Usethe concept of decision making and looping, classes, objects, methods, and strings to develop programs.	K2
CO3	Analyzeandtounderstandtheconceptsofinterfacesinheritanceandpackages.Explain and develop programs in applet Programming, Managing errors and Exceptions.	K2& K3
CO4	Identify thedataandapply thesuitableconceptsof datastructurein programming.	K4&K5
CO5	Demonstratelinkedlist anditsoperationsfor programming.	K5

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
Elective Course – III	**Course Code:**24UMC3E03		**Course Title:** NUMERICAL METHODS	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	4	60	4	100

Course Objectives

- Interpolate an unknown value from a given set of data.
- Compute numerical solutions of algebraic and transcendental equations.
- Compute numerical solutions of integration problems and ODE.

UNIT-I:INTERPOLATION

Newton's Forward and Backward formulae for Interpolation- Central difference formulae-Gauss Forward, Gauss Backward, Stirling's and Bessel's formulae- Simple Problems only.(Derivations of Formulae and Proof of theorems are excluded).(Chapter6: Section6, Chapter7:Section 7to 7.6).

UNIT-II:INTERPOLATIONWITHUNEQUALINTERVALS

Lagrange's Formula for Interpolation – Newton's Divided Differences formula.Lagrange's inverse interpolation -Simple Problems only. (Derivations of Formulae and Proof of theorems areexcluded).(Chapter6: Section8.5 to 8.8)

UNIT-III:SOLUTIONOFALGEBRAICAND TRANSCEDENTAL EQUATIONS

Numerical solutions of polynomial and Transcendental equations in one variable. Bi-Section Method –Method of false position (Regular Falsi Method)-MethodofIteration-NewtonRaphsonMethod(Derivationsof the formulae are excluded).(Chapter3: Section3.1 to3.4)

UNIT-IV:NUMERICALINTEGRATION

Quadrature Formula for equidistant ordinates based on Newton's Forward formula – Trapezoidal rule – Simpson's one third rule – Simpson's Three Eighth rule - Simple Problems only.(Derivations of Formulae are excluded).(Chapter9: Section 9.7to 9.9,9.13,9.14).

UNIT-V:

Numerical solution of ordinary differential equation (firstorder only), Euler's method - Modified Euler's method- Picard's method ofsuccessive approximation.-Runge-Kutta method fourth order only.(Chapter11: Section 11,11.8, 11.9, 11.11, 11.12)

Text Book

1. P.Kandasamy & K.Thilagavathy,K.Gunavathi,*Numerical Methods*, S.Chand &Co.

Reference Books

1. B.D.Gupta (2001) Numerical Analysis Konark publications Ltd., Delhi
2. Dr.M.K.Venkataraman,NumericalMethodsinScience&Engineering, Fifth edition (1999),The National Publishing Company, Chennai.
3. H.C. Saxena (1991) Finite difference and numerical analysis S.Chand&Co. Delhi.
4. S.Arumugham(2003) Numerical Methods, New Gamma Publishing, Palayamkottai.
5. M.K.Jain, S.R.K.Iyengar, R.K.Jain, Numerical methods for scientificandengineeringcomputation,Sixthedition(2012), New age International Publishers, New Delhi.
6. E.Balagurusamy, Numerical Methods (1999),TataMc.Graw Hill, New Delhi.

7. T.K.ManicavachagamPillai&Prof.S.Narayanan,Numerical Analysis,NewEdition(2001),S.ViswanathanPrinters& PublishersPvtLtd,Chennai.

E-Learning Source:https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	ApplyingtheMethodsofinterpolationto computethe missing valueinreal lifeproblems.	K1
CO2	Computethemissingvaluesforunequalintervalsusing Divideddifferences and Lagrange Method	K2
CO3	ApplyNumericalMethodsto evaluate numericalsolutionofalgebraic transcendental equations..	K2& K3
CO4	Computedefiniteintegralfordifferent combinationsofintegrandsusing various methods and analyze their accuracy.	K4&K5
CO5	Evaluatethesolutionoffirstorderdifferentialequationusing Euler,Picard's and Runge - Kutta Methods.	K5

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	2	1	2	1	3	2	1
CLO2	3	3	2	1	2	-	3	2	1
CLO3	3	3	2	1	2	1	3	2	1
CLO4	3	3	3	2	2	-	3	2	1
CLO5	3	3	3	2	2	1	3	2	1

Program: B.Sc Mathematics with Computer Application				
SKILL ENHANCEMENT COURSE SEC-04 (Entrepreneurial Based)	**Course Code:**24UMC3S02		**Course Title:** COMPUTATIONAL MATHEMATICS	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	1	15	1	100

Course Objectives

- Underst and use the structure of C++ programme, to solve different Numerical Methods.

UNIT-I:

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

UNIT-II:

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

UNIT-III

C++ProgramforBisectionmethod-C++ProgramforMethodof falseposition-C++ Program forMethod of successive approximation- C++ Program for Newton-Raphson's method.

UNIT-IV

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

Text Book:

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.

E-learning Sourceshttps://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the roots of algebraic equations using different methods like,Newton- Raphson method, Secant Method etc.	K1 & K2
CO2	Solvesystemofalgebraic equationsusingdirectanditerativemethods.	K2 & K3
CO3	TowriteC++Programtocomputerootsofalgebraicequations usingBisectionmethod, Newton-Raphson method etc.	K3 & K4
CO4	TowriteC++Programtocomputerootsofalgebraicequations usingBisectionmethod, Newton-Raphson method etc.	K5
CO5	TowriteC++Programtosolvethesystemofalgebraicequations usingtheJacobian method, Gauss Seidal method.	K6

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

Mapping of COs with POs

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	2	3	3	3	3

CO3	3	3	3	3	3
CO4	2	3	3	2	3
CO5	2	3	3	3	2

Program: B.Sc Mathematics with Computer Application				
SKILL ENHANCEMENT COURSE SEC-05 (Discipline / Subject Specific)		**Course Code:** 24UMC3S03		**Course Title:** ADVANCED EXCEL
Semester III	**Hours/Week** 2	**Total Hours** 30	**Credits** 2	**Total Marks** 100

Course Objectives

To bridge the gap and facilitate transition from higher secondary to tertiary education;To instil confidence among stake holders and inculcate interest for Mathematics

UNIT-I:

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

UNIT-II:

Mode-Using Excel to Find the Mode-Midrange-Using Excel to Calculate the Mid range-Weighted Mean-Using Excel for Descriptive Statistics.(Chapter-3:Pages114to125)

UNIT-III:

Basic Concepts of Probability: Basics of Probability- Law of Large Numbers-Excel Demonstration of the Law of Large Numbers- Relative Frequency Probability-Complementary Events-Unlikely Events and Unusual Events-Rare Event Rule.(Chapter4: Pages175 to 184)

UNIT – IV:

Addition Rule- Disjoint Events- Complementary Events and the Addition Rule-Multiplication Rule: Basics- Applications of the Multiplication Rule- Hypothesis Testing:

Effectiveness of Gender Selection-Rationalefor the Multiplication Rule.(Chapter4:Pages 190 to 204)

UNIT-V:

Multiplication Rule: Complements and Conditional Probability- Counting- Permutations and Combinations- Using Excel to Calculate Factorials, Permutations, and Combinations- FundamentalCountingRule-PermutationsRule-Combinations Rule.(Chapter4: Pages209 to 222)

Text Book

1. MarioF.Triola,"Elementary Statistics Using Excel,"Fifth Edition, Pearson New International Edition, 2014

Reference Books

1.E.Balagurusamy,"ComputerOrientedStatisticaland Numerical Methods," MacmillanPublishersIndiaLimited,2000.

2.V.K.Rohatgi,A.M.E.Saleh,"Anintroductionto probability and statistics," JohnWiley &Sons, 2015.

3. B.Held,B.Moriarty&T.Richardson,"MicrosoftExcel FunctionsandFormulas",StylusPublishing,LLC, 2019.

4.N.J.Salkind,"Excelstatistics:Aquickguide",Sage Publications,2015.

5.J.Schmuller,"StatisticalanalysiswithExcelfordummies," Johnwiley&sons, 2013.

E-learning Sources

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	ComputeMeanandMedianusingExcel.	K1 & K2

CO2	ComputeMode,Midrange,WeightedMeanusingExcel.	K2 & K3
CO3	Demonstrate law of large numbers using Excel.	K3 & K4
CO4	Testinghypothesisbyapplyingfundamentalsconceptsofprobability.	K5
CO5	Compute permutation and combinations using Excel.	K6

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

Mapping of COs with POs

	Pos						**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CLO1	3	1	2	2	3	2	2	2	3
CLO2	3	2	2	1	3	2	1	3	2
CLO3	1	2	1	1	2	1	1	1	1
CLO4	2	3	3	1	1	2	2	2	2
CLO5	2	2	3	1	2	2	2	1	3

Program: B.Sc Mathematics with Computer Application				
Core Course – VII	**Course Code:** 24UMC4C07		**Course Title:**WEB TECHNOLOGY	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
IV	4	60	3	100

Course Objectives

- Use PHP and MYSQL to develop dynamic website for user on the internet.
- Get exposed to the concepts of operators and control statements for decision making.
- Gain the knowledge on file management in PHP.
- Introduce the looping for working with string and numeric functions.
- Study the Array functions and creating classes to develop the Website.

UNIT-I:

Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable –Understanding Data types– Setting and Checking variables.(Chapter1: PageNo. 3,7,10 & Chapter2: PageNo.21-27)

UNIT-II:

Datatypes–UsingConstants–Manipulating Variables with Operators. Controlling Program Flow: Writing SimpleConditional Statements– WritingMore Complex Conditional Statements.(Chapter2: PageNo. 27,29,30 &Chapter3: PageNo. 49-58)

UNIT-III:

Repeating Action with Loops–Working with String and Numeric Functions.Working withArrays:Storing Data in Arrays– Processing Arrays with Loops and Iterations.(Chapter3: PageNo. 59-64, 66-82, &Chapter4: PageNo.85-95)

UNIT – IV:

Using Arrays with Forms- Working with Array Functions–WorkingwithDatesand TimesUsing Functions and Classes: Creating User-Defined Functions-Creating Classes – Using Advanced OOP Concepts.(Chapter4:PageNo.97-107,110-118,&Chapter5:Page No.121-132,135-139,143-154).

UNIT-V:

Workingwith Files and Directories: Reading Files-Writing Files-Processing Directories.(Chapter6: PageNo. 159-165,169-183)

Text Book

1. VikramVaswani,"*PHP A Beginner's Guide*",Tata McGraw Hill 2008.

Reference Books

1. StevenHolzner"*ThePHPCompleteReference*",TataMcGrawHill,2007.
2. StevenHolzer,"*SpringintoPHP*",TataMcGrawHill 2011, 5thEdition.

E-learning Sources

- https://www.w3schools.com/php/
- https://t4tutorials.com/e-learning-management-system-project-in-php-mysql-projects-for-mcs-mit/

- https://www.php.com/e-learning-video-library/
- https://www.w3schools.com/php

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Applythe conceptsimplecontrol statementsofPHP forWebdevelopment.	K1 & K2
CO2	Analyzethestringsandnumericfunctionstoworkwith Arrays.	K2 & K3
CO3	Apply the knowledge of creating classes as done in OOP.	K3 & K4
CO4	Formulate the file management in PHP.	K5
CO5	Analyzedataandunderstandthebasicdevelopingconceptsin PHP.	K6

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
Practical	**Course Code:** 24UMC4P04		**Course Title:** WEB TECHNOLOGY	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
IV	2	30	2	100

Course Objectives

- Use PHP and MYSQL to develop dynamic website for user on the internet.
- Get exposed to the concepts of operators and control statements for decision making.
- Gain the knowledge on file management in PHP.
- Introduce the looping for working with string and numeric functions.
- Study the Array functions and creating classes to develop the Website.

List of Program :

1. Write a PHP program to find the Even and Odd numbers.
2. Writea PHP program tofind the Leap year.
3. Writea PHP program to swapping of two numbers
4. Writea PHP program which adds up columns and rows of given table.
5. Write a PHP program to compute the sum of first n given prime numbers.
6. Write a PHP programto find valid an email address.
7. Write a PHP program to convert an umber written in words to digit.
8. Write a PHP script to delay the program execution for the given number of seconds.
9. Write a PHP script,which changes the colour of the first character of a word.
10. Write a PHP program to find multiplication table of a number.
11. Write a PHP program to calculate Factorial of a number.
12. Write a PHP program on file handling.

Text Book

1. VikramVaswani,"*PHP A Beginner'sGuide*",Tata McGraw Hill 2008.

Reference Books

1. Steven Holzner"*The PHP Complete Reference*",Tata McGraw Hill,2007.
2. Steven Holzer,"*SpringintoPHP*",TataMcGrawHill 2011, 5thEdition.

E-learning Sources

- https://www.w3schools.com/php/
- https://t4tutorials.com/e-learning-management-system-project-in-php-mysql-projects-for-mcs-mit/
- https://www.php.com/e-learning-video-library/
- https://www.w3schools.com/php

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Applythe conceptsimplecontrol statementsofPHP forWebdevelopment.	K1 & K2
CO2	AnalyzethestringsandnumericfunctionstoworkwithArrays.	K2 & K3
CO3	Apply the knowledge of creating classes as done in OOP.	K3 & K4
CO4	Formulate the file management in PHP.	K5
CO5	Analyzedataandunderstandthebasicdevelopingconceptsin PHP.	K6

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
Core Course-VIII	**Course Code:**24UMC4C08		**Course Title**: NUMBER THEORY	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
IV	4	75	4	100

Course Objectives

- Apply the various techniques of solving puzzles in applications.
- Know the connections of number theory with other branches.
- Gain competence in solving problems.

UNIT –I: Introduction

Basic binary Operations on the set of Integers – Ordering of Integers - Well Ordering Principle – Mathematical Induction. (Simple problems only).(Chapter1: Section 1.1,1.3 to 1.6)

UNIT –II:DivisibilityTheory

Greatest common Divisor-Relatively Prime integers – Algorithmto find G.C.D: Investigation ofthe set of integers{bx+cy}- Least Common Multiple. (Simple problems only).(Chapter2: Section 2.3to 2.5 and 2.7)

UNIT-III :Linear Diophantine Equations

Linear Diophantine Equations–The Equation ax+by=c–Diophantine Equations in Three or More Unknowns (Statements and simple problems only).(Chapter3: Section3.2 to 3.4)

UNIT – IV:QuadraticResidues

Introduction, quadratic residues, Elementary Properties. (Simple problems only).(Chapter9: Section9.1 to 9.3).

UNIT-V:Perfect Numbers:

Introduction, Perfect Numbers, Necessary and Sufficient Conditions for a positive Integer to be an even Perfect number, Mersenne Numbers, Fermat Numbers. (Simple problems only)(Chapter10: Section 10.1 to 10.5).

TextBook

1. Theory of Numbers,Dr.Sudhir,K.Pundir,Pragati Prakashan Publications**,** third Revised edition 2012.

Reference Books

1. An introduction to the Theory of Numbers (Vth edition) by Ivan Niven,Herbert S.Zuckarmanand HughL.Montgometry John Wiley & Sons, Inc.2001.

2.Elementary theory of numbers,cy.Hsiung,Allied publishers, 1995.

3.ElementaryNumberTheory,AllynandBaconInc.,Boston, 1980.

E-Learning Sources https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental concepts of Mathematical Induction.	K1
CO2	Evaluate the Greatest common Divisor and Least common multiple using the algorithms.	K2 & K3
CO3	DetermineandunderstandtheDiophantineequationsforthreeormoreunknowns.	K3 & K4
CO4	Demonstratethequadraticresidues,elementaryPropertiess	K4 & K5
CO5	EvaluateandanalyzetheperfectnumbersusingtheMersenneandFermat Numbers.	K6

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

Mapping of COs with POs Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	2	2	2	2	2	3	2	2
CLO2	2	3	2	3	2	2	3	2	1
CLO3	2	3	3	2	2	2	3	2	2

CLO4	3	2	2	2	3	2	3	2	2
CLO5	2	2	2	2	2	2	2	2	2

Program: B.Sc Mathematics with Computer Application

Elective Course-IV	**Course Code:**24UMC4E04	**Course Title**: MATHEMATICAL STATISTICS

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
IV	4	75	4	100

Course Objectives

- Acquire the knowledge about Theoretical Distributions and understand the concepts of correlation and regression.
- Be familiarized with the applications of various test of significance

UNIT-I:

Theoretical Distributions : Binomial – Poisson – Normal distributions-Fittingofdistributions-SimpleProblems(Derivations excluded) (Chapter 8: Sec 8.4,8.5, Chapter 9: Sec 9.2)

UNIT-II:

Correlation and Regression : Karl Pearson's Coefficient of Correlation-Rank Correlation–Lines of Regressions-Simple Problems (Derivations excluded) (Chapter 10: Sec 10.4 to 10.7, Chapter 11: Sec11.2 to 11.4)

UNIT-III:

Test of Significance For Large Samples: Z-test- Test for Single Proportion- Test of Significance for Difference of Proportions -Test of Significance for Single Mean-Test of Significance for Difference of Means-Simple Problems (Derivations excluded) (Chapter14:Sec14.6to14.8, Chapter16 : Sec16.11)

UNIT-IV:

Test of Significance For Small Samples:t- Test–Testfor SingleMean-Test for Difference Of Means- Paired t-Test For Difference of Means - F- Test for

Equality of Population Variance- Simple Problems (Derivations excluded) (Chapter16:Sec16.2to16.10)

UNIT-V:

Chi-SquareTest-Test of Goodness of Fit,Test for Independence of Attributes. Analysis Of Variance: ANOVA–OneWay Classification, Two Way Classification. Simple Problems (Derivations excluded).(Chapter15: Sec15.1 to15.7)

Text Book

1. S.C.Gupta and V.K.Kapoor,Elements of Mathematical Statistics, Third edition(2015) Sultan Chand & Sons publications, NewDelhi.

Reference Books

1. P.R.Vittal,Mathematical Statistics (2002),Margham Publications,Chennai.
2. S.C.GuptaandV.K.Kapoor,Fundamentals of Mathematical Statistics, Eleventh edition(2002)Sultan Chand & Sons Publications
3. RobertV.Hogg,JosephMckean&CraigA.T,Introductionto Mathematical Statistics,(2013)PearsonsEducation India
4. GeorgeW.Snedecor,WilliamG.Cochran,Statistical Methods(1967),Oxford &IBH Publishers
5. Dr.S.P.Gupta,StatisticalMethods,41st edition(2011),SultanChand &Sons,NewDelhi.

E-Learning Source: https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	ApplyBinomial,PoissonandNormaldistributionpropertiesto solvereallifeproblems.	K1
CO2	Studytherelationshipbetweentwoormorevariables.	K2 & K3
CO3	UnderstandtheusesofLarge Samples.	K3 & K4
CO4	Applythe concept ofsmall sampletest to solvereal life problems.	K5
CO5	Applyandexaminechi-squaretestandanalysetheprinciplesofdesignsofexperimen	K6

	ts to yield valid conclusions.	

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

Mapping of COs with POs Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	3	3	1	2	3	3	1
CLO2	3	3	3	3	1	2	3	3	1
CLO3	3	3	3	3	1	2	3	3	1
CLO4	3	3	3	3	1	2	3	3	1
CLO5	3	3	3	3	1	2	3	3	1

Program: B.Sc Mathematics with Computer Application				
SKILL ENHANCEMENT COURSESEC-06	**Course Code:** 24UMC4CS04		**Course Title :** MATHEMATICS FOR COMPETITIVE EXAMINATION–III	
Semester	**Hours/Week**	**TotalHours**	**Credits**	**TotalMarks**
IV	2	30	2	100

Course Objectives

- Remembering the concept of Logarithms.
- Understanding the concept of Simple Interest–Compound Interest.
- Analyzing the concepts of Stocks and Shares.

UNIT – I

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

UNIT – II

Logarithms-Area.(Chap– 23&24)

UNIT – III

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

UNIT – IV

Calendar-Clocks.(Chap– 27 &28)

UNIT – V

Stocks & Shares.(Chap– 29)

Text Books

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

ReferenceBooks

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

E-learning Sourceshttps://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Explainin detailabout SimpleInterest andCompound Interest.	K1 & K2
CO2	Explain Logarithmsand Area.	K3
CO3	ExplainVolume& SurfaceAreas andRaces &Games of Skill.	K4
CO4	ExplainCalendarandClocks.	K5
CO5	Explain Stocks &Shares.	K6

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

Mapping of COs with POs Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

Program: B.Sc Mathematics with Computer Application				
SKILL ENHANCEMENT COURSE SEC-07 (Discipline / Subject Specific)	**Course Code:**24UMC4S05		**Course Title:** STATISTICS WITH R PROGRAMMING	
Semester IV	**Hours/Week** 2	**Total Hours** 30	**Credits** 2	**Total Marks** 100

Objectives of the Course:

- To acquire the practical knowledge of R programming for solving problems in mathematical statistics.

UNIT-I:

Introduction to R Software:How to Download and Install R- Using R for Descriptive Statistical Analysis and Plots-Basics of R-R Data Types-Scalars-Vectors-Matrices-Data Frames.(Chapter-2: Section 2.1to2.3.2.4)

UNIT-II:

Lists-Factors-DateandTime-MissingValues-DataCreation- Data Type Conversion-Variable Information.(Chapter-2:Section 2.3.2.5to2.3.6)

UNIT-III:

Basic Operations in R-Control Structures-Conditional -For Loop-Repeat Loop- While Loop-Built-In Functions in R-Numerical Functions-Character Functions-Statistical Probability Functions- Other Statistical Functions-Other Useful Functions-User-Written Functions. (Chapter-2: Section 2.4 to 2.4.4)

UNIT–IV:

Importing, Reporting, and Writing Data-Packages- Working Directory and R Script-Reading and Writing Local Flat Files-Reading and Writing Excel Files-Connection Interfaces- Connect to a Database- Data Exploration -Data Exploration through Visualization-BarChart-PieChart-Box-PlotDistributions.(Chapter-2:Section 2.4.4to2.5.1.3)

UNIT-V:

Descriptive Statistics: Central Tendency-The Mean-The Median-TheMode-MeasureofDispersion-ShapesoftheDistribution- Symmetric and Asymmetric- Skewness Illustrated. (Chapter- 3: Section 3.1 to 3.3).

Recommended Text

1. Mustapha Abiodun Akinkunmi,"Business Statistics with Solutions in R"deGruyter-Berlin,2019.

Reference Books

1. PeterDalgaard,"IntroductoryStatisticswithR"SecondEdition, Springer, 2008.
2. YosefCohen,JeremiahY.Cohen,"StatisticsanddatawithR"John Wiley& SonsLtd.2008.

CO Number	CO Statement	Knowledge Level
CO1	UnderstandtheusageofRSoftwareandabletohandlebasicdatatypesofR.	K1
CO2	Createdata,findthemissingvalues,convertingdata types	K1&K2
CO3	Applythecontrolstructures,numericalandstatisticalfunctions.	K2& K3
CO4	Toimportfiles,abletoconnectwithadatabaseandhandlePieandBar Charts.	K4&K5
CO5	Computemean,median,modeandskewnessusingR.	K5

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

Program: B.Sc Mathematics with Computer Application

Core Course -IX		**Course Code:** 24UMC5C09		**Course Title:** MODERN ALGEBRA
Semester V	**Hours/Week** 5	**Total Hours** 75	**Credits** 4	**Total Marks** 100

Course Objectives

- Establishtherelationshipsbetweenabstractalgebraicstructuregroups&subgroupwithfamiliarnumbersystemssuchasintegersandrealnumbers.
- Learntheextendedconceptofgroup&fieldsuchasringsand itsproperties.

UNIT – I:

Introductiontogroups-Subgroups-cyclicgroupsandpropertiesof cyclic groups-Lagrange's Theorem-A counting principle – Examples.(Chapter2: Section2.1 to2.5)

UNIT – II:

NormalsubgroupsandQuotientgroup-Homomorphism- Automorphism - Examples.(Chapter2: Section2.6 to 2.8)

UNIT – III:

Cayley'sTheorem-Permutationgroups - Examples.(Chapter2: Section2.9 to 2.10)

UNIT – IV:

Definition and examples of ring- Some special classes of rings- homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings.(Chapter3:Section 3.1to 3.10)

UNIT – V:

Thefieldofquotientsofanintegraldomain-EuclideanRings-The particular Euclidean Ring – Examples.(Chapter3: Section3.6 to 3.8)

Text Book

TopicsinAlgebra–I.N.Herstein,WileyEasternLtd.SecondEdition(1st January2006)

Reference Books

1. JohnB.Fraleigh, A FirstCourseinAbstractAlgebra, 7thEd.,Pearson,2002.

2. M.Artin,AbstractAlgebra, 2ndEd.,Pearson, 2011.

3. JosephAGallian, ContemporaryAbstractAlgebra, 4thEd.,Narosa, 1999.

E–Learning Sources

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstratetheimportanceof algebraic propertiesanddefinitions.	K1
CO2	Explain the equivalence relation between sets and equivalence classes to form a normal Sub group and quotient group.	K1&K2
CO3	Demonstratetheembeddingofanygroup into agroupofpermutations.	K2& K3
CO4	Identifytherings andanalyzethebasictheoreticalproofs.	K4&K5
CO5	Formulate any given integer as eitherprimeorproductofprimesinauniqueway.	K5

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

Mapping of COs with POs Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	3	2	2	2	3	2	2
CLO2	3	3	3	2	2	2	2	2	2
CLO3	3	3	2	2	2	2	3	3	2
CLO4	3	3	2	2	2	2	3	2	2
CLO5	3	3	3	2	2	2	3	2	2

Program: B.Sc Mathematics with Computer Application

Core Course –X	**Course Code:**24UMC5C10	**Course Title:** REAL ANALYSIS

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	5	75	4	100

Course Objectives

- RealNumbersandpropertiesofReal–valued functions.
- Connectedness,Compactness,CompletenessofMetric spaces.
- Convergenceofsequencesoffunctions,Examplesandcounter examples
- Learnthe concepts ofSets ofmeasurezero&Riemann Integral.

Unit I :

CountabilityofRealNumbers-LeastUpperBounds- SequencesandSubsequence-LimitofaSequence-Convergentand DivergenceSequence-BoundedSequences-MonotoneSequences- CauchySequences.(Chapter1: Section1.5,1.6, 1.7and Chapter2: Section 2.1to 2.6, 2.10)

Unit II:

ConvergenceandDivergenceofSeries-SerieswithNon- NegativeTerms-AlternatingSeries- ConditionalandAbsoluteConvergence-TestforAbsoluteConvergence.(Chapter3: Section 3.1to 3.4, 3.6)

Unit III:

Limit of a Function – Metric Spaces-Function Continuousat a Point on the Real Line-Open Sets-Closed Sets.(Chapter4: Section 4.1, 4.2 and Chapter5: Section 5.1, 5.4, 5.5)

Unit IV:

Connectedness, Completeness and Compactness: More about Open Sets-Connected Sets-Complete Metric Spaces-Compact Metric Spaces.(Chapter6: Section6.1,6.2, 6.4)

Unit V:

SetsofmeasureZero-DefinitionoftheRiemannIntegral Existence ofthe Riemann Integral (statement only) Properties of Riemann Integral.(Chapter7: Section7.1 to 7.4)

Recommended Text:

MethodsofRealAnalysis-RichardR.Goldberg(JohnWiley&sons,2nd edition) (Indian edition – Oxford and IBH Publishing Co, New Delhi, 1st January 2020)

Reference Books:

1. Principles of Mathematical Analysis by Walter Rudin, Tata McGraw Hill Education, Third edition (1 July 2017).
2. MathematicalAnalysisTomMApostal,NarosaPublishingHouse,2nd edition(1974),Addison-Wesleypublishing company,NewDelhi.

E–Learning Sources

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understandthefundamentalpropertiesofrealanalysisand thelimitsinsequences, Series & derivatives.	K1
CO2	Identifythegiven seriesaswhether convergentordivergent.	K1&K2
CO3	Applytheabstractideasandrigorousmethods ofmathematicalanalysisto Practical problems.	K2& K3
CO4	Construct mathematical proofsforbasicresultsofreal analysis.	K4&K5
CO5	Identifying thesetsofmeasurezeroandRiemann Integral.	K5

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	2	2	2	2	3	2	2

CLO2	3	3	2	2	2	2	3	2	1
CLO3	3	3	2	2	2	2	2	2	2
CLO4	3	3	2	2	2	2	2	2	2
CLO5	3	3	2	2	2	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
Core Course-XI	**Course Code:** 24UMC5C11		**Course Title:** MECHANICS	
Semester V	**Hours/Week** 5	**Total Hours** 60	**Credits** 4	**Total Marks** 100

Course Objectives

- Todemonstrate theapplication ofMechanics invarious fields.
- Todeveloptheproficiencyinproblem solving.
- TohaveaninsightintoTypesofforces,Moments,Kinematics, Simple Harmonic Motion, Projectiles, Impact and Central orbits.

UNIT-I: Force

Newton's laws of motion – Resultant of two forces on a particle.EquilibriumofaParticle:Equilibriumofaparticle–Limitingequilibrium of a particle on an inclined plan.(Chapter2: Section 2.1,2.2 and Chapter3: Section 3.1, 3.2)

UNIT-II: ForcesonaRigidBody

MomentofaForce –Generalmotion of a rigid body – Equivalent systems of forces-Parallel Forces – Forces along the sides of a triangle.(Chapter4: Section4.1 to 4.5)

UNIT-III: Kinematics

Velocity-Velocity of particle describing a circle - Resultant velocity -Relative velocity -Acceleration-Rectilinear motion - Rectilinear motion with a constant acceleration.

Rectilinear Motion under Varying Force:

Simple Harmonic Motion – Projection of a particle having a uniform circular motion-Composition of two simple harmonic motions of same period.(Chapter1: Section

1.2,1.3;Chapter12: Section 12.1) .

UNIT-IV: Projectiles

Forces on a projectile– Displacement as a combination of vertical and horizontal displacements-Nature of trajectory-Results pertaining to the motion of a projectile-Maximum horizontal range for a given velocity-Two trajectories with a givenspeed and range-Projectile projected horizontally.

Impact:

Impulsive force-Impact of sphere – Impact of two smooth spheres –Direct impact of two smooth spheres- Oblique impact of two smooth spheres- Change in Kinetic energy.(Chapter13:Section13.1;Chapter14:Section14.1to14.3and14.5)

UNIT-V: CentralOrbits

Generalorbits–Centralorbit–Conicasa centred orbit.(Chapter16: Section 16.1 to 16.3).

TEXT BOOK

1. A. Ruina and R. Pratap, Introduction to Statics and Dynamics,Oxford University Press, 2014.
2. Duraipandian.P, LaxmiDuraipandian, MuthamizhJayapragasam. (2015)Mechanics (6^{th} RevisedEdition),NewDelhi,S.ChandandCo.
3. S.L.Loney,TheElementsofStaticsandDynamics, Cambridge UniversityPress,1904.

Reference Books:

1. J.L.MeriamandL.G.Kraige,EngineeringMechanics:Statics, Seventh Edition,Wileyand sons Pvt ltd., New York, 2012.
2. J.L. Meriam, L. G. Kraige, and J.N. Bolton, Engineering Mechanics:Dynamics, 8^{th}edn, Wiley and sons Pvt ltd., New York, 2015.
3. A. K. Dhiman, P.Dhinam and D. Kulshreshtha, Engineering Mechanics(StaticsandDynamics),McGrawHillEducation(India)PrivateLimited,NewDelhi,2015

E–Learning Sources:

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Discussthefundamentalconceptofforcesandapplytheconceptof Lami'stheoremto determine the equilibrium of a particle under three or more forces.	K1
CO2	Explain differentforces actingon arigidbody.	K2
CO3	Understandtheconceptsofvelocity,accelerationandcomposition ofS.H.Mintwo directions	K3& K4
CO4	Solveproblemsrelatingtothemotionofaprojectile.Understandim pulsiveforcesand analyze loss of K.E due to direct and oblique impact.	K5
CO5	Able to derive basic orbit equations and its relationship to the conic Sections.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	3	2	2	2	3	3	2
CLO2	3	3	3	2	2	2	3	3	2
CLO3	3	3	3	2	2	2	3	3	2
CLO4	3	3	3	2	2	2	3	3	2
CLO5	3	3	3	2	2	2	3	3	2

3 – Strong **2 – Medium** **1 – Low**

Program: B.Sc Mathematics with Computer Application				
Core Course-XII	**Course Code:** 24UMC5C12		**Course Title:** PROJECTWITH VIVAVOCE	
Semester V	**Hours/Week** 4	**Total Hours** 60	**Credits** 4	**Total Marks** 100

Program: B.Sc Mathematics with Computer Application				
Elective Course-V	**Course Code:** 24UMC5E05		**Course Title:** OPERATIONSRESEARCH–I	
Semester V	**Hours/Week** 4	**Total Hours** 60	**Credits** 3	**Total Marks** 100

Course Objectives

- Todevelopcomputational skills.
- Todeveloplogicalthinkinginformulatingindustryoriented problems.
- Toapplythesetechniquesin reallife situations.

UNIT-I

Linear programming: General LPP- Mathematical formulation-Solutionfor LPPBy Graphical Method and Simplex Method (finite optimalsolution, unboundedsolution, alternative optimal solution)- Slack andsurplus variables – SolutionforLPP with unrestricted variables(Book1:Chapter2:Section2.1to2.4;Chapter3:Section3.1,3.2;Chapter4:Section4.1to 4.3,4.5,4.7,4.9;Chapter5:Section5.1,5.2,5.4-5.8,5.11)

UNIT-II

Artificial Variable Technique- Big-M Method (Charner's Penalty Method) – Concept of Duality- Dual theorem (only statement)- Reading solution ofthe dual from the final simplex table of the primal and vice-versa.(Book1:Chapter4:Section4.4;Chapter5:Section5.3,5.9,5.12;Chapter6: Section6.1, 6.5-6.7).

UNIT-III

Transportation problems: Mathematical formulation- North- West corner Rule - Least cost Method- Vogel's approximation method- Optimality test(Book2: Chapter10:Section 10.1to 10.3, 10.5,10.6,10.8-10.10)

UNIT-IV

Assignment problems:Hungarian method of solving an assignmentproblem – Unbalanced assignment problems – Traveling Salesman(routing)problem.(Book 2: Chapter11: Section 11.1 to 11.5 and 11.7).

UNIT-V

Game theory: Two persons zero sum games, the Maxmin- Minmax principle, Saddle point and Value of games, Games without saddle points,Pure and mixed strategies, Properties of optimal mixed strategies, Dominance property.(Book2: Chapter17:Section 17.1 to 17.7).

TEXT BOOK:

1. R.K.Gupta,OperationsResearch,KrishnaPrakash.
2. KantiSwarup,P.K.GuptaandManMohan,OperationsResearch, S.Chand&Co,Delhi.

Reference Books:

1. Taha,OperationResearch,PrinticeHall,NewDelhi.
2. V.Sundaresan,K.S.GanapathySubramanian,&K.Ganesan,Resource ManagementTechniques(OperationsResearch),A.R.Publications, Nagapattinum District .
3. Kalavathy,OperationsResearchVikasPublishingHousePvt.Ltd.
4. Gupta P.K&Hira D.S ,Problems in Operations Research, S.Chand&Co, Delhi.
5. S.D.Sharma,OperationsResearch,KedharNathRamNathco,Meerut.

E–Learning Sources:

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Analyseandstudytheconceptsinlinear programmingproblemstooptimize the solution.	K1
CO2	Examine,Analyse,formulate and evaluate the optimal solutions using various methods in linear programming.	K2
CO3	Evaluate the optimal solution for various industry oriented problems using Quantitative and qualitative tools like Modi's method	K3& K4
CO4	Compute theoptimal solution byusingHungarian methodto minimizethecost.	K5
CO5	Analysetheapplicationofgametheoryin variousfieldsandobtainthebest Solution to optimize the function.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	3	2	3	3	2
CLO2	3	2	3	3	3	2	3	3	1
CLO3	3	3	3	3	3	2	3	3	2
CLO4	3	3	3	3	3	3	3	3	2
CLO5	3	3	3	3	3	3	3	3	1

Program: B.Sc Mathematics with Computer Application				
Elective Course-VI	Course Code: 24UMC5E06		Course Title: ARTIFICIAL INTELLIGENCE&MACHINE LEARNING	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	3	45	3	100

Course Objectives

- Knowledgeon AI Techniques.
- IntroducetheAIrepresentations and mappings.
- Studythesimplelogicalfactsusing reasoning.
- IntroducingtheMachineLearninganditstypes.
- Gainknowledgeon modelling and Evaluating.

UNIT-I

Introduction:AIProblemsAItechniques,ProblemSpacesandSearch: Defining the problem ofspacesearch-Statespacesearch–ProductionSystems–Problem Characteristics.(Book1:Chapter1: Sec1.1to1.7,Chapter2: Sec2.1to2.4)

UNIT-II

Heuristic Search techniques: Generate and Test– Hill Climbing– Best First search, Problem Reduction, Constraint Satisfaction, Means-end analysis-Knowledge representation issues: Representations and mappings– Approaches.(Book1:Chapter3: Sec3.1to3.6,Chapter4: Sec4.1to4.4)

UNIT-III

Using Predicate Logic: Representation in simple facts in logic – Representation instance and is a Relationship– Computable functions and predicates–Resolution. Representation Knowledge using Rules: ProceduralVs Declarative Knowledge – Logic Programming – Forward Vs Backward Reasoning.(Book1:Chapter5:

Sec5.1to5.5,Chapter6: Sec6.1to6.3)

UNIT-IV

Introduction to Machine Learning: What is Machine Learning? – Types of Machine Learning–Applications of Machine Learning Issues in MachineLearning.PreparingtoModel:MachineLearningActivities–Typesof Data –Data quality and remediation.(Book2:Chapter1:Sec1.4to1.7,Chapter2:Sec2.1to2.6)

UNIT-V

Modelling and Evaluation: Selecting a model Training a model– Model representation and Interpretation–ModelPerformanceandevaluation–Improvingperformanceofamodel.(Book2:Chapter1:Sec1.4to1.7,Chapter2:Sec2.1to2.6)

TEXT BOOK:

1. ElaineRich"ArtificialIntelligence",McGraw-HillCompanies.
2. SaikatDutt,SubramanianChandramouli,AmitKumarDass,"MachineLearning",PearsonEducationIndia,2019.

Reference Books:

1. StuartRussell&PeterNorvig,"ArtificialIntelligenceAModernApproach",Perason, 2nd Edition.
2. VSJanakiRaman,KSarukesi,P.Gopalakrishnan,"Foundations ofArtificialIntelligentandExpertSystems",MacMillanIndialimited.

E–Learning Sources:

1. https://www.opentrends.net/en/article/basic-concepts-artificial-intelligence
2. https://data-flair.training/blogs/heuristic-search-ai/
3. https://www.educba.com/machine-learning-techniques/
4. https://www.analyticsvidhya.com/blog/2021/05/machine-learning-model-evaluation/

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Knows the basic concept in AI Techniques.	K1

CO2	Knows Heuristic search and Hill Climbing.	K2
CO3	Understandthe ProceduralandDeclarative knowledge.	K3& K4
CO4	KnowthebasicconceptonMachineLearningandits types.	K5
CO5	ConceptofModellingandevaluatingthemodels.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

	Program: B.Sc Mathematics with Computer Application			
Practical	**Course Code:** 24UMC5P05	**Course Title:** ARTIFICIALINTELLIGENCE&MACHINE LEARNING		
Semester V	**Hours/Week** 2	**Total Hours** 30	**Credits** 2	**Total Marks** 100

Course Objectives

- Knowledgeon AI Techniques.
- IntroducetheAIrepresentations and mappings.
- Studythesimplelogicalfactsusing reasoning.

- IntroducingtheMachineLearninganditstypes.
- Gainknowledgeon modelling and Evaluating.

List of Program

1. Write a program to implement the Hill Climbing problem
2. Write a program to implement the Towers of Hanoi problem
3. Write a program to implement the Missionaries and Cannibals problem
4. Write a program to implement the 8queens problem
5. Write a program to implement the A*Algorithm
6. Write a program to Implement the Breadth first algorithm
7. Solving Regression&ClassificationusingDecisionTrees
8. Root Node Attribute Selection forDecisionTreesusingInformation Gain
9. Bayesian Inference in Gene Expression Analysis .
10. Pattern Recognition Application using Bayesian Inference

TEXT BOOK:

1. ElaineRich“Artificial Intelligence”,McGraw-HillCompanies.

2.SaikatDutt,Subramanian Chandramouli, AmitKumar Dass, “Machine Learning”, Pearson Education India,2019.

Reference Books:

1. Stuart Russell &PeterNorvig,“Artificial Intelligence A Modern Approach”,Perason, 2nd Edition.
2. VSJanakiRaman,KSarukesi,P.Gopalakrishnan,“Foundations ofArtificialIntelligentandExpertSystems”,MacMillanIndialimited.

E–Learning Sources:

5. https://www.opentrends.net/en/article/basic-concepts-artificial-intelligence
6. https://data-flair.training/blogs/heuristic-search-ai/
7. https://www.educba.com/machine-learning-techniques/
8. https://www.analyticsvidhya.com/blog/2021/05/machine-learning-model-evaluation/

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Knows the basic concept in AI Techniques.	K1
CO2	Knows Heuristic search and Hill Climbing.	K2
CO3	Understandthe ProceduralandDeclarative knowledge.	K3& K4
CO4	KnowthebasicconceptonMachineLearningandits types.	K5
CO5	ConceptofModellingandevaluatingthemodels.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Core Course-XIII	**Course Code:**24UMC6C13		**Course Title:**LINEAR ALGEBRA	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	6	90	4	100

Course Objectives

- Learn the concept of vector spaces and subspaces.
- Explore the dimension of vector space using bases and linear dependence concepts.
- Understand the concept of Inner product space and its properties.

UNIT-I: VECTOR SPACES

Subspaces – Linear Combinations and linearspan - Linear Dependence and Linear independence - Related Problems.(Book1:Chapter1:Section1.2to1.5)

UNIT-II: VECTORSPACES(CONTD)

LinearSpan,Bases,Dimensionof Vector Spaces- Maximal linearly independent subsets - Dual spaces - RelatedProblems (Book1:Chapter1: Section1.6,1.7; Chapter2:Section 2.6)

UNIT-III: INNERPRODUCTSPACES

Inner Product Space, Definition, Examples,Schwartz inequality, Orthogonal Set,OrthonormalSet,Gram Schmidt Orthogonalization Process - Related Problems.(Book2:Chapter4:Section4.4)

UNIT-IV: LINEARTRANFORMATIONS

Algebra of Linear transformations, Regular and Singular Linear Transformations,RankofLinearTransformation– RelatedProblems.(Book2:Chapter6:Section6.1)

UNIT-V: LINEARTRANSFORMATIONS (CONTD)

CharacteristicRoots,CharacteristicVectors&Matrices–Canonicalforms– triangularforms.(Book2:Chapter6:Section6.2to6.4).

TEXT BOOK:

1. Linear Algebra-Stephen H Friedberg, Arnold J Inseland Lawrence E Spence, 5th edition (2018) Pearson.
2. I.N.Herstein,TopicsinAlgebra,WileyEasternLtd.SecondEdition,2006.

Reference Book

1. N.S.Gopalakrishnan, University Algebra, New Age International Publications, Wiley Eastern Ltd.
2. DavidC.Lay,LinearAlgebraanditsApplications,3rdEd.,Pearson Education Asia, Indian Reprint, 2007.
3. S.Lang,IntroductiontoLinearAlgebra,2ndEd., Springer,2005.
4. GilbertStrang,Linear AlgebraanditsApplications,Thomson, 2007.

E–Learning Sources:

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Identifythevectorspacesand its subspaces	K1
CO2	Findthedimensionofvectorspaceanddistinguishthelineardependentand Independent vectors which expands knowledge in Matrices.	K2
CO3	Evaluatethelength&distanceofvectorsandtoconstructorthonormalsetsof Vectors that help in understanding the few concepts of mechanics.	K3& K4
CO4	Abletocharacterizethelineartransformationasone-one,ontotransformationsand their role in carrying a basis of vector space to another vector space.	K5
CO5	Expresslineartransformationinmatrixformtomakethecalculationor Representation easier, for analyzing the given data.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	3	2	2	2	3	2	2
CLO2	3	3	3	3	2	2	3	3	2
CLO3	3	3	3	2	3	2	3	2	2
CLO4	3	3	3	2	2	2	2	2	2
CLO5	3	3	3	3	2	2	3	2	2

Program: B.Sc Mathematics with Computer Application

Core Course-XIV	**Course Code:** 24UMC6C14	**Course Title:**COMPLEX ANALYSIS

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	6	90	4	100

Course Objectives

- To equip the students with the understanding of the fundamental concept ofComplex function.
- Understand the conceptofmappingsandtransformations.
- Calculate series expansions for analytical complex-valued functions and evaluate contour integrals & definite integrals.

UNIT-I: Analytic Functions

Functions of a Complex variable –Limits – Theorem on limits –Continuity Derivatives – Differentiation formulas –Cauchy Riemann equation – conditions for differentiability – Polar coordinates– Analytic functions– Harmonic functions.(Chapter2: Section 12, 15 to26)

UNIT-II: MappingbyElementaryFunctions&ConformalMapping

Lineartransformations–Thetransformation$w=\frac{1}{z}$Mappingsby$w=\frac{1}{z}$ –Linear fractional transformations (bilinear)-Animplicitform –Preservation of angles.(Chapter8: Section90,91 and Chapter9: Section101).

UNIT-III: Complex Integration

Contours-Contour integrals–Cauchy- Goursat Theorem (statement only)- Cauchy theorem for simply and multiply connected domains– Cauchy integral formula – Formula for derivatives– Liouville's theorem –Fundamental theorem of Algebra.(Chapter4: Section37, 39, 40, 46, 48, 49, 50 to 53)

UNIT-IV: SeriesandSingularities

Convergenceofsequences-Convergenceofseries TaylorandLaurentSeries(statementonly)-Isolatedsingularpoints–Residues-Cauchy'sResiduetheoremResidueatinfinity-ThethreetypesofIsolatedsingularpoints-

Residuesatpoles-Zeros of analytic functions –Zeros and Poles-Meromorphic function-Argument principle Rouche's theorem.(Chapter5:Section55,56,57,60 and Chapter 6: Section68to73to76,86,87).

UNIT-V: ApplicationsofResidues

Evaluationof Improper Integrals

(i) $\int_0^{2\pi} f(cos\theta, sin\theta)d\theta$

(ii) $\int_{-\infty}^{\infty} f(x)dx$ where f(x)=$\frac{g(x)}{h(x)}$

(iii) $\int_{-\infty}^{\infty} f(x)sinmxdx$&$\int_{-\infty}^{\infty} f(x)cosmxdx$ where f(x)=$\frac{g(x)}{h(x)}$

(Chapter7: Section78to 81,85)

TEXT BOOK:

1. R.V.Churchill and J.W. Brown(2014), Complex Variables andApplications(8th edition)McGrawHillInternationalBookCo.,NewYork

Reference Book

1. S. Ponnusamy and H. Silverman, Complex variables with applications, Birkhauser, 2006.
2. TheodoreW.Gamelan,ComplexAnalysis,SpringerVerlag,2008
3. Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.
4. Richard A. Silverman, Introductory Complex Analysis. Dover Publications, 1972.
5. S.Arumugam,A.ThangapandianIssac,A.Somasundaram,ComplexAnalysis,Scitechpublications,Chennai.
6. T.K.ManicavachagamPillay,Dr.S.P.Rajagopalan,Dr.R.Sattanathan,ComplexAnalysis,S.Viswanathanprintersand Publishers,pvt.Ltd,(2011).

E–Learning Sources:

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level

CO1	Derive Cauchy Riemann equation and identify analytic functions.	K1
CO2	DiscussBilineartransformationandvariousstandardtransformations.	K2
CO3	Evaluate the value of the function using Cauchy's integral theorem.	K3& K4
CO4	Representthegivenfunctioninaseriesform,validinadomainandclassifyzerosand singularities of an analytic functions.	K5
CO5	Evaluatedifferent typesofcontourintegralsusingresiduetheorem.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	3	2	2	2	3	2	1
CLO2	3	3	2	2	2	2	3	2	2
CLO3	3	3	2	2	2	2	3	2	2
CLO4	3	3	2	2	2	2	3	3	2
CLO5	3	3	3	2	2	2	3	2	2

Program: B.Sc Mathematics with Computer Application				
Core Course-XV	**Course Code:** 24UMC6C15		**Course Title:**DISCRETE MATHEMATICS AND GRAPHTHEORY	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	6	90	4	100

Course Objectives

- Evaluate basic logic statements including compound statements, implications,

inverses, converses, and contrapositives using truth tables and the properties of logic.

- Appreciate the basic principles of lattices, and its properties.
- Simplify expression using the properties of Boolean algebra;basic principles of Boolean algebra
- Learn core ideas of graph definition and graph operations in graph theory.
- Study the theorem of Eulerian and Hamiltonian graphs.

Unit-I:

Propositional Calculus Tautology and contradiction – Equivalence of formulae– Dualitylaw–Tautologicalimplications-Normalforms–Disjunctive normal forms – Conjunctive normal forms.(Book1: Chapter1:Section 1.2.1 to1.2.11; Chapter3:Section 1.3.1, 1.3.2)

Unit-II:

Lattices-Introduction–Principle of duality-Properties of Lattices–sub Lattice DistributiveLatticemodularlattices–Bounded lattice-Complemented lattice.
(Book1: Chapter4:Section 4.1.1 to 4.1.5).

Unit-III:

Boolean Algebra Definition – Other basic laws of Boolean Algebra Principle of duality for Boolean Algebras–ATOM definition ATOMIC Boolean algebra –Finite Boolean Algebra. Boolean expression – Definition – Boolean function – Literal – Minterm and Maxterm, Normal forms and Canonicalforms.(Book1: Chapter4: Section 4.2 to 4.5).

Unit- IV:.

Graphs, Sub graphs and Connectedness Introduction – Definition and examples – Degrees –Sub graphs – Isomorphisms – Walks, Trails and Paths – Connectedness and Components –blocks –Connectivity.(Book1: Chapter5:Section 5.1, 5.2).

Unit-V:

EulerianandHamiltonianGraphsIntroduction-Euleriangraphs–Hamiltoniangraphs
(Book2: Chapter8: Section 8.5

TEXT BOOK:

1. J.P.Tremblay&R.Manohar,"DiscreteMathematicalStructureswithApplication toComputerScience",Tata Mcgraw–Hill Publication Co.limited, New Delhi,2003.
2. SeymourLipschutz,MarcLarasLipson,VarshaH.Patil,Discrete

Mathematics(Schaum'sOutlines)(2017).

Reference Book

1. Dr.M.K.Venkataraman,Dr.S.SridharanandDr.M.Chandrasekeran,DiscreteMathematics,theNationalPublishingCompany.
2. Ralph.P.Grimaldi,"DiscreteandCombinatorialMathematics:AnAppliedIntroduction"4th edition,PearsonEducationAsia,Delhi2002.
3. Dr.S.P.Rajagopalan,Dr.R.Sattanathan,DiscreteMathematics,MarghamPublications,Chennai-17

E–Learning Sources:

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Prepare Mathematical conceptsinterms of predicates,quantifiers,and logical connectives.	K1
CO2	Analyse and Identify the knowledge of lattices and its properties.	K2
CO3	Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.	K3& K4
CO4	Learnto understand,analyseand developastrongback groundingraph Theory	K5
CO5	IdentifytheknowledgeofEulerianandHamiltoniantheoremusing Terminology of graphs.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	3	3	3	2	3	3	2

CLO2	3	3	3	3	3	2	3	3	2
CLO3	3	3	3	3	3	2	3	3	2
CLO4	3	3	3	3	3	2	3	3	2
CLO5	3	3	3	3	3	2	3	3	2

Program: B.Sc Mathematics with Computer Application				
Elective Course-VII	**Course Code:** 24UMC6E07		**Course Title:** OPERATIONSRESEARCH–II	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	5	75	3	100

Course Objectives

- To develop computational skills
- To develop logical thinking in formulating industry oriented problems
- To apply the setechniques in reall ife situations.

UNIT-I: Inventory theory

Introduction- Variables in an inventory problem - Need of inventory- Inventory problems - Advantages and disadvantages of inventory- Classification ofinventory Models - Economic lot size model.

Model I: Economic lot size model with uniform rate size demand, Infiniterate ofproduction andno shortages.(Derivation excluded - simple problems)

Model II: Order level model with Uniform rate of demand (Q to be fulfilled in constant time) infinite rate of production and having shortages to be fulfilled.(Derivation excluded - simple problems)(Book 2: Chapter19: Section 19.1 to 19.11).

UNIT-II:

Model III: The general single period model of profit maximization with time independent cost - Discrete case only..(Derivation excluded -simple problems)

Model IV: Purchase Inventory model with – One price break – Two price breaks. (derivation excluded),Newspaper boy problem (Derivation excluded - simple problems)(Book2: Chapter19: Section 19.12;Chapter20:Section 20.4, 20.5).

UNIT-III:Queuingtheory

Generalconceptsanddefinitions-Classification ofqueues-Poisson process, Models (Noderivations, only problems)(Book1: Chapter12: Section 12.1to 12.6, 12.11 to 12.20)

UNIT-IV:NetworkAnalysis

Introduction-Networkdiagramrepresentation- Rules for drawingNetwork diagram-labeling: Fulkerson's 'I-J' rule- time estimates and critical path- In Network analysis-Forward pass, Backward passcomputation-Determinationoffloatsand slacktimes-Determination of critical path. **Project Evaluation and Review Techniques (PERT)**: Optimistic time-mostlikelyTime-Pessimistictime-Expectedtime-variance-Rulesfor finding variance of eventsproblems in PERT.(Book 2: Chapter25: Section 25.1 to 25.7)

UNIT-V:SequencingProblem

njobsthrough2machines –njobsthrough 3machines –n jobs through m machines (Book 2: Chapter12: Section 12.1, 12.4, 12.5)

Text Books

1. R.K.Gupta,Operations Research,KrishnaPrakash
2. Kanti Swarup,P.K.Gupta and Man Mohan Operations Research,S.Chand&Co, Delhi.

Reference Books

1. 1.Taha,Operation Research,PrinticeHall,NewDelhi.
2. V.Sundaresan, K.S. Ganapathy Subramanian, &K.Ganesan, Resource Management Techniques (Operations Research),A.R. Publications, NagapattinumDistrict .
3. Kalavathy,Operations ResearchVikas PublishingHousePvt.Ltd.
4. GuptaP.K&HiraD.S,ProblemsinOperationsResearch,S.Chand&b Co, Delhi
5. S.D.Sharma,OperationsResearch,KedharNathRamNath&co,Meerut

E–Learning Sources:

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Studyandanalysetheconceptsofvariousinventorymodels tominimizethecost.	K1
CO2	Analyseandevaluatetheprofit usinginventory models.	K2

CO3	Analysethevariousqueueingmodelsandevaluatethevariou ssystemperformance Measures of Queueing to maximize the profit.	K3& K4
CO4	Analyseandensureoptimum utilization ofhumanandother resources.	K5
CO5	Estimateoptimum solutionforsequencing problems.	K6

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

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	3	2	3	2	3	3	2
CLO2	3	3	3	2	3	2	3	3	2
CLO3	3	3	3	3	2	2	3	3	3
CLO4	3	3	3	3	2	2	3	3	3
CLO5	3	3	3	3	1	2	3	3	2

Program: B.Sc Mathematics with Computer Application				
Elective Course-VIII	**Course Code:** 24UMC6E08		**Course Title:** DATA SCIENCE	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	3	45	3	100

Course Objectives

- Knowledge on Data Scienceand its benefits.
- Introduce the Data Science process.
- Study the simple Algorithms and modeling.
- Introducing the Hadoop framework.
- Gain knowledge by using case study.

UNIT I:

Introduction to Data Science– Benefits and uses –Facetsofdata– Data science process–Big data eco system and data science.(Chapter1: Sec1.1 to 1.6)

UNIT II:

TheDatascienceprocess–Overview–researchgoals-retrieving data-transformation–Exploratory DataAnalysis– Modelbuilding.(Chapter 2: Sec 2.1 to 2.8)

UNIT III:

Algorithms-Machinelearningalgorithms–Modeling process – Types – Supervised – Unsupervised-Semi-supervised.(Chapter3: Sec3.1 to 3.5)

UNIT IV:

IntroductiontoHadoop–framework–Spark–replacing MapReduce– NoSQL – ACID – CAP–BASE–types.(Chapter5 Sec5.1to 5.3,Chapter6 Sec6.1)

UNIT V:

Case Study–Prediction of Disease-Setting research goals- Data retrieval preparation-exploration-Diseaseprofiling- presentationandautomation.(Chapter6: Sec6.2).

Text Book

1. Davy Cielen,ArnoD.B.Meysman,MohamedAli,"Introducing Data Science",manning Publications 2016.

Reference Books

1. Roger Peng,"The Art of Data Science",lulu.com2016.
2. Murtaza Haider,"Getting Startedwith DataScience–Making SenseOfData With Analytics",IBMpress,E-book.
3. Davy Cielen,ArnoD.B.Meysman,MohamedAli,"Introducing Data Science: Big Data,MachineLearning,andMore,Using Python Tools",DreamtechPress2016.
4. Annalyn Ng, Kenneth Soo,"Numsense!DataScienceforTheLayman:NoMath Added",2017,1stEdition.
5. CathyO'Neil,Rachel Schutt,"Doing Data Science Straight Talk from the Front line", O'ReillyMedia2013.
6. LillianPierson,"DataScience forDummies",2017,2ndEdition.

E–Learning Sources:

- https://intellipaat.com/blog/tutorial/data-science-tutorial/
- https://www.guru99.com/data-science-tutorial.html.
- https://www.w3schools.com/

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	KnowsthebasicconceptofDataScience	K1
CO2	Knowledge on Data Science process	K2
CO3	Understand theModeling procedure.	K3 & K4
CO4	Knowthebasic conceptof Hadoop.	K4 & K5
CO5	Understandthe DataScienceusingCasestudy.	K6

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
Practical	**Course Code:** 24UMC6P06		**Course Title:** DATA SCIENCE	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	2	30	2	100

Course Objectives

- Knowledge on Data Science and its benefits.
- Introduce the Data Science process.
- Study the simple Algorithms and modeling.
- Introducing the Hadoop framework.
- Gain knowledge by using case study.

Practical outline Course:

1. Demonstrate the working of“id”and“type”functions.
2. Find all prime numbers with in a given range.
3. Print n terms of Fibonacci series using iteration.
4. Demonstrate use of slicing in string.
5. Compute the frequency of the words from the input.Theoutput should output after sorting the key alphanumerically.
6. Write a program that accepts a comma separated sequence of words as input and prints the words in a comma-separated sequence after sorting them alphabetically.
7. Demonstrate use of list & related functions.
8. Demonstrate use of Dictionary & related functions.
9. Demonstrate use of tuple & related functions.
10. Implement stack using list.
11. Implement queue using list.
12. Read and write from a file.
13. Copy afile.

Text Book

1. Davy Cielen,Arno D.B.Meysman,MohamedAli,“Introducing Data Science”,manning Publications 2016.

Reference Books

1. RogerPeng,“TheArtofDataScience”,lulu.com2016.
2. MurtazaHaider,“Getting Startedwith Data Science–Making Sense Of Data With Analytics”,IBM press,E-book.
3. DavyCielen,ArnoD.B.Meysman,MohamedAli,“IntroducingDataScience:BigData,MachineLearning,andMore,UsingPython Tools”,DreamtechPress2016.

4. AnnalynNg,KennethSoo,"Numsense! Data Science for the Layman:NoMath Added",2017,1stEdition.
5. CathyO'Neil,RachelSchutt,"DoingDataScienceStraightTalkfromtheFrontline", O'ReillyMedia2013.
6. LillianPierson,"DataScience forDummies",2017,2ndEdition.

E–Learning Sources:

- https://intellipaat.com/blog/tutorial/data-science-tutorial/
- https://www.guru99.com/data-science-tutorial.html.
- https://www.w3schools.com/

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Knows the basic concept of DataScience	K1
CO2	Knowledge on Data Science process	K2
CO3	Understand theModeling procedure.	K3 & K4
CO4	Know the basic conceptof Hadoop.	K4 & K5
CO5	Understand the DataScienceusingCasestudy.	K6

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

Mapping of COs with POs

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	1	3	2	2	2	2
CLO2	3	2	1	1	3	2	2	2	2
CLO3	3	2	1	1	3	2	2	2	2
CLO4	3	2	1	1	3	2	2	2	2
CLO5	3	2	1	1	3	2	2	2	2

Program: B.Sc Mathematics with Computer Application				
PROFESSIONAL COMPETENCY SKILL PCS-01	**Course Code:** 24UMC6PC01		**Course Title:** LaTeX PRACTICAL	
Semester VI	**Hours/Week** 2	**Total Hours** 30	**Credits** 2	**Total Marks** 100

Course Objectives

- To enable the Students to Prepare Research Articles in LaTeX format.

Course Outline:

1. Creation of a Document with different Alignments (Left,Right, Center, Justify).
2. Typing a Letter for Appling a job.
3. Creation of Own Bio-Data.
4. Creating a Table Structure.
5. Typing a Mathematical Expression involving Differentiation, Integration and Trigonometry.
6. Typing a Mathematical Expression using all Expressions and Inequalities.
7. Creation of an Article using LaTeX.
8. Inserting Picture in a LaTeX.
9. Preparing a question paper in LaTeX Format.
10. Creation of Power Point Presentation in LaTeX.

Text Book

1. David F Griffiths and Desmond J. Higham, ***Learning LaTeX,*** SIAM(Society for Industrial and Applied Mathematics) Publishers, Phidelphia, 1996.

Reference Books

1. Nambudiripad, K.B.M., 2014. ***LaTeX for beginners.*** Narosa Publishing House private limited, New Delhi.
2. 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.
3. L. Lamport, ***LATEX: A Document Preparation System, User's Guide and Reference***

Manual, Addison-Wesley, Newyork, Second edition, 1994.

E–Learning Sources:

https://nptel.ac.in

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Make different Alignments in a document and an Application for ajob	K1
CO2	GenerateBio-DataandTableStructures.	K2
CO3	Create Mathematical Statementsusing LaTeX	K3 & K4
CO4	PrepareArticlesandInsertingPictures.	K5
CO5	PrepareQuestionpaperandPowerPointpresentationinLaTeXformat.	K5 & K6

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