V.V.VANNIAPERUMAL COLLEGE FOR WOMEN
(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Re-accredited with 'A' Grade (3rd Cycle) by NAAC
VIRUDHUNAGAR - 626 001

OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM REGULATIONS AND SYLLABUS
(with effect from Academic Year 2023 - 2024)

V.V.Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 13 UG Programmes (Aided), 14 UG Programmes (SF), 13 PG Programmes and 6 Ph.D. Programmes. The curricula for all these Programmes, except Ph.D. Programmes, have been framed as per the guidelines given by the University Grants Commission (UGC) &Tamil Nadu State Council for Higher Education (TANSCHE) under Choice Based Credit System (CBCS) and the guidelines for Outcome Based Education (OBE).

The Departments of Commerce, English, History, Mathematics, Biochemistry and Tamil upgraded as Research Centres offer Ph.D. Programmes as per the norms and regulations of Madurai Kamaraj University, Madurai and do not come under the purview of CBCS.

A. CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose Courses from the prescribed Courses. The CBCS is followed as per the guidelines formulated by the UGC. The performance of students is evaluated based on the uniform grading system. Computation of the Cumulative Grade Point Average (CGPA) is made to ensure uniformity in evaluation system.

List of Programmes in which CBCS/Elective Course System is implemented

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UG PROGRAMMES

Arts & Humanities	:	History (E.M. & T.M.), English, Tamil
Physical & Life Sciences	:	Mathematics, Zoology, Chemistry, Physics, Biochemistry, Home Science - Nutrition and Dietetics, Costume Design and Fashion, Microbiology, Biotechnology, Computer Science, Information Technology, Computer Applications and Computer Applications - Graphic Design
Commerce & Management	:	Commerce, Commerce (Computer Applications), Commerce (Professional Accounting), Business Administration

PG PROGRAMMES

Arts & Humanities	:	History, English, Tamil
Physical & Life Sciences	:	Mathematics, Physics, Chemistry, Zoology, Biochemistry, Home Science - Nutrition and Dietetics, Computer Science, and Computer Applications (MCA) *
Commerce & Management	:	Commerce, Business Administration (MBA) *

* AICTE approved Programmes

OUTLINE OF CHOICE BASED CREDIT SYSTEM – UG

1. Core Courses
2. Discipline Specific Elective Courses (DSEC)
3. Elective Courses
4. Skill Enhancement Courses (SEC)
5. Non Major Elective Courses (NMEC)
6. Ability Enhancement Compulsory Courses (AECC)
7. Generic Elective Courses (GEC)
8. Self Study Courses
9. Extra Credit Courses (Self Study Courses) (Optional)

List of Non Major Elective Courses (NME)

(2023-2024 onwards)

UG PROGRAMMES

Name of the Course	Course Code	Semester	Department
Introduction to Tourism	23UHIN11	I	History(EM)
Indian Constitution	23UHIN21	II	History(EM)
சுற்றுலா ஓர் அறிமுகம்	23UHIN11	I	History (TM)
இந்திய அரசியலமைப்பு	23UHIN21	II	History(TM)
Popular Literature and Culture	23UENN11	I	English
English for Professions	23UENN21	II	
பேச்சுக்கலைத்திறன்	23UTAN11	I	Tamil
பயன்முறைத் தமிழ்	23UTAN21	II	
Practical Banking Basic Accounting Principles	23UCON11 23UCON22	I II	Commerce (Aided)
Financial Literacy-I Financial Literacy -II	23UCON12 23UCON21	I II	Commerce (SF)
Self-Employment and Startup Business Fundamentals of Marketing	23UCCN11 23UCCN21	I II	Commerce CA (SF)
Women Protection Laws	23UCPN11	I	Commerce (Professional Accounting)
Basic Labour Laws	23UCPN21	II	

Basics of Event Management	23UBAN11	I	Business Administration
Business Management	23UBAN21	II	
Quantitative Aptitude I	23UMTN11	I	Mathematics
Quantitative Aptitude II	23UMTN21	II	
Physics for Everyday life -I	23UPHN11	I	Physics
Physics for Everyday life -II	23UPHN21	II	
Food Chemistry	23UCHN11	I	Chemistry
Drugs and Natural Products	23UCHN21	II	
Ornamental fish farming and Management	23UZYN11	I	Zoology
Biocomposting for Entrepreneurship	23UZYN21	II	
Foundations of Baking and Confectionery	23UHSN11	I	Home Science – Nutrition and Dietetics
Basic Nutrition and Dietetics	23UHSN21	II	
Nutrition and Health	23UBCN11	I	Biochemistry
Life Style Diseases	23UBCN21	II	
Social and Preventive Medicine	23UMBN11	I	Microbiology
Nutrition & Health Hygiene	23UMBN21	II	
Herbal Medicine	23UBON11	I	Biotechnology
Organic farming and Health Management	23UBON21	II	
Basics of Fashion	23UCFN11	I	Costume Design And Fashion
Interior Designing	23UCFN21	II	
Office Automation	23UCSN11	I	Computer Science
Introduction to Internet and HTML 5	23UCSN21	II	
Office Automation	23UITN11	I	Information Technology
Introduction to HTML	23UITN21	II	
Introduction to HTML	23UCAN11	I	Computer Applications
Fundamentals of Computers	23UCAN21	II	
Introduction to HTML	23UGDN11	I	Computer Applications - Graphic Design
Fundamentals of Computers	23UGDN21	II	
Organic Farming	23UBYN11	I	Botany
Nursery and Landscaping	23UBYN12		
Mushroom Cultivation	23UBYN21	II	
Medicinal Botany	23UBYN22		
Cadet Corps for Career Development I	23UNCN11	I	National Cadet Corps
Cadet Corps for Career Development II	23UNCN21	II	

List of Ability Enhancement Compulsory Courses & Generic Elective Courses (GEC) Offered

ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

1. Value Education
2. Environmental Studies

GENERIC ELECTIVE COURSES - 1

1. Human Rights
2. Women Studies

GENERIC ELECTIVE COURSES - 2

1. Constitution of India
2. Modern Economics
3. Adolescent Psychology
4. Disaster Management

B. OUTCOME BASED EDUCATION (OBE) FRAMEWORK

The core philosophy of Outcome Based Education rests in employing a student - centric learning approach to measure the performance of students, based on a set of pre-determined outcomes. The significant advantage of OBE is that it enables a revamp of the curriculum based on the learning outcomes, upgrade of academic resources, quality enhancement in research and integration of technology in the teaching–learning process. It also helps in bringing clarity among students as to what is expected of them after completion of the Programme in general and the Course in particular. The OBE directs the teachers to channelise their teaching methodologies and evaluation strategies to attain the Programme Educational Objectives (PEOs) and fulfill the Vision and Mission of the Institution.

Vision of the Institution

The founding vision of the Institution is to impart Quality Education to the rural womenfolk and to empower them with knowledge and leadership quality.

Mission of the Institution

The mission of the Institution is to impart liberal education committed to quality and excellence. Its quest is to mould learners into globally competent individuals instilling in them life-oriented skills, personal integrity, leadership qualities and service mindedness.

B.1 Programme Educational Objectives, Programme Outcomes and Programme Specific Outcomes

It is imperative for the institution to set the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Course Outcomes (COs), consistent with its Vision and Mission statements. The PEOs and the POs should be driven by the mission of the institution and should provide distinctive paths to achieve the stated goals. The PEOs for each Programme have to fulfill the Vision and Mission of the Department offering the Programme.

Vision

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Mission

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B.1.1 Programme Educational Objectives (PEOs)

PEOs are broad statements that describe the career and professional achievements that the programme is preparing the graduates to achieve within the first few years after graduation. PEOs are framed for each programme and should be consistent with the mission of the Institution.

Programme Educational Objectives (PEOs) of B.Sc.Mathematics Programme

The students will be able to

- become successful teachers in schools, Bank officers, government officials, Statisticians and IT professionals.
- apply mathematical skills in analyzing and solving problems in real life situations.
- upgrade themselves by pursuing higher education and engaging in social work to boost their morality.

Key Components of the Mission Statement	PEO1	PEO2	PEO3
chisel the creative and critical faculties through in-depth study of English literary texts	✓	✓	-
instill a fervour for research endeavours	✓	-	-
strengthen their linguistic competency for employability	✓	✓	✓
better living	-	-	✓

B.1.2 Programme Outcomes (POs)

POs shall be based on Graduate Attributes (GAs) of the programme. The GAs are the attributes expected of a graduate from a programme in terms of knowledge, skills, attitude and values. The Graduate Attributes include Disciplinary Knowledge, Communication Skills, Critical Thinking, Problem Solving, Analytical Reasoning, Research Related Skills, Co-operation/ Team Work, Scientific Reasoning, Reflective Thinking, Information/ Digital Literacy, Multicultural Competence, Moral and Ethical Awareness/ Reasoning, Leadership Qualities and Lifelong Learning.

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

1. apply effectively the acquired knowledge and skill in the field of Arts, Physical Science, Life Science, Computer Science, Commerce and Management for higher studies and employment. (*Disciplinary Knowledge*)
2. articulate innovative thoughts and ideas proficiently in both in spoken and written forms. (*Communication Skills)*
3. identify, formulate and solve problems in real life situations scientifically / systematically by adapting updated skills in using modern tools and techniques. (*Scientific Reasoning and Problem Solving)*
4. critically analyse, synthesize and evaluate data, theories and ideas to provide valid suggestions through assignments, case studies, Internship and projects for the fullfillment of the local, national and global developmental needs. (*Critical Thinking and Analytical Reasoning)*
5. use ICT in a variety of self-directed lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning)*
6. self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence)*
7. uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness)*

B.1.3 Programme Specific Outcomes (PSOs)

Based on the Programme Outcomes, Programme Specific Outcomes are framed for each UG Programme**.** Programme Specific Outcomes denote what the students would be able to do at the time of graduation. They are Programme-specific and it is mandatory that each PO should be mapped to the respective PSO.

On completion of B.Sc. Mathematics Programme, the students will be able to

PO1-*Disciplinary Knowledge*

PSO1.a: apply the strong knowledge acquired in core and related areas of

Mathematics and its applications to continue higher studies, research activities or for employment.

PSO 1.b: apply the concrete subject knowledge and skill obtained in mathematics and carrier oriented courses to appear for competitive examinations.

PO2–*Communication Skills*

PSO2: communicate efficaciously on complex mathematical concepts, theorems and models with mathematics community and with society at a large.

PO3–*Scientific Reasoning and Problem Solving*

PSO 3.a: implement logical reasoning and analytical skills in mathematics as foundation for advanced cases in other disciplines.

PSO3.b: formulate real life problems into mathematical model and apply mathematical techniques to find solutions to the problems.

PO4–*Critical Thinking and Analytical Reasoning*

PSO 4.a: consider the social, cultural, economic and environmental constraints, apply the mathematical knowledge and skills to arrive at optimal solutions**.**

PSO 4.b: analyse mathematical data using principles of mathematics, interpret the results and provide valid conclusions applicable to various sectors of the nation.

PO5–*Digital Literacy, Self-directed and Lifelong Learning*

PSO5: make use of e-resources and strive for self- directed lifelong learning in their field of interest to face career challenges.

PO6–*Co-operation / Team Work and Multicultural Competence*

PSO6: work effectively as a member or leader of a diverse team in multidisciplinary environment and become entrepreneur and bring multicultural richness in Mathematics.

PO7–*Moral and Ethical Awareness*

PSO7 practice the code of ethics of mathematics community in their career.

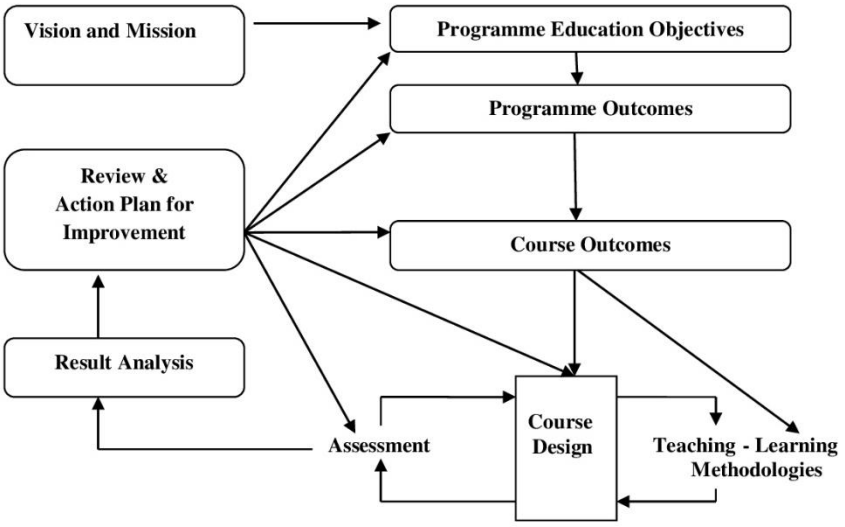
PO-PEO Mapping Matrix

Attainment of PEOs can be measured by a PO-PEO matrix. PEOs should evolve through constant feedback from alumnae, students, industry, management, *etc*. It is mandatory that each PEO should be mapped to at least one of the POs

PEOs POs/PSOs	PEO1	PEO2	PEO3
PO1/PSO1.a	-	✓	✓
PO1/PSO1.b	✓	✓	✓
PO2/PSO2.a	✓	✓	-
PO2/PSO2.b	✓	✓	-
PO3/PSO3	-	✓	✓
PO4/PSO4.a	-	✓	✓
PO4/PSO4.b	✓	✓	-
PO5/PSO5	✓	✓	-
PO6/PSO6	-	✓	✓
PO7/PSO7	-	-	✓

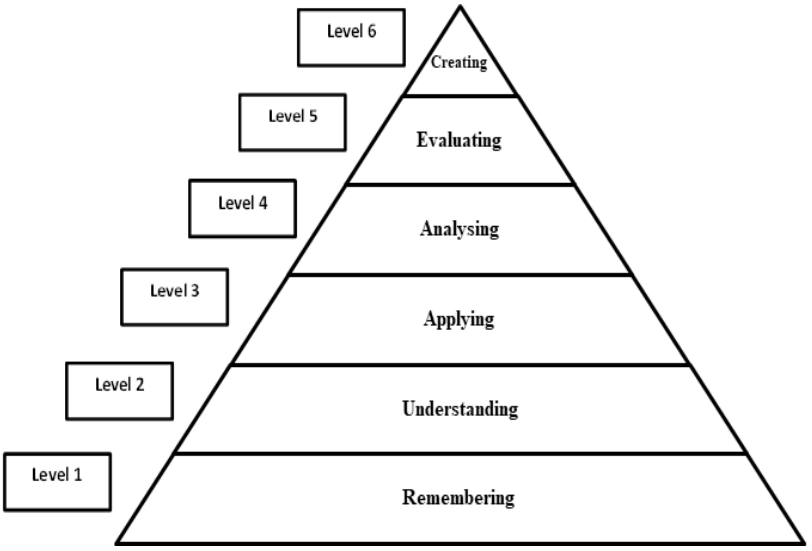
B.1.4 Course Outcomes (COs)

Course Outcomes are narrow statements restricted to the Course contents given in five units. Course Outcomes describe what students would be capable of, after learning the contents of the Course. They reflect the level of knowledge gained, skills acquired and attributes developed by the students after learning of Course contents. COs are measurable, attainable and manageable in number. COs contribute to attain POs in such a way that each CO addresses at least one of the POs and also each PO is reasonably addressed by adequate number of COs.



It is important to determine the methods of assessment. A comprehensive assessment strategy may be outlined using the revised Bloom's Taxonomy levels.

BLOOM'S TAXONOMY



CO – PO Mapping of Courses

After framing the CO statements, the COs framed for each Course is mapped with POs based on the relationship that exists between them. The COs which are not related to any of the POs is indicated with (-), signifying Nil. Measurement Mapping is based on Four Points Scale [High (H), Medium (M), Low (L) and Nil (-)]. For calculating weighted percentage of contribution of each Course in the attainment of the respective POs, the weights assigned for H, M and L are 3, 2 and 1 respectively.

CO-PO/PSO Mapping Table (Course Articulation Matrix)

PO/PSOs / COs	PO1/ PSO1	PO2/ PSO2	PO3/ PSO3	PO4/ PSO4	PO5/ PSO5	PO6/ PSO6	PO7/ PSO7
CO1							
CO2							
CO3							
CO4							
CO5							

ELIGIBILITY FOR ADMISSION

The candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Tamil Nadu or any other equivalent examination accepted by the Academic Council with English as one of the subjects in Higher Secondary Course.

DURATION OF THE PROGRAMME

The candidates shall undergo the prescribed Programme of study for a period of three academic years (six semesters).

MEDIUM OF INSTRUCTION

English

COURSES OFFERED

Part I	:	Tamil/Hindi/Alternate Course
Part II	:	English
Part III	:	Core Courses
		Discipline Specific Elective Courses
		Elective Courses
		Self Study Course
Part IV	:	Skill Enhancement Courses (SEC)
		Non Major Elective Courses (NMEC)
		Ability Enhancement Compulsory Courses (AECC)
		Generic Elective Courses (GEC)
		Self Study Course
Part V	:	National Service Scheme/ Physical Education/ Youth Red Cross Society/ Red Ribbon Club/ Science Forum/ Eco Club/ Library and Information Science/ Consumer Club/ Health and Fitness Club/ National Cadet Corps/ Rotaract Club

B.2 EVALUATION SCHEME

B.2.1.PART II

Components	**Internal Assessment Marks**	**Summative Examination Marks**	**Total Marks**
Theory	15	75	100
Practical	5+5	-	

INTERNAL ASSESSMENT

Distribution of Marks

Three Periodic Tests - Average of the best two will be considered

Mode of Evaluation		**Marks**
Periodic Test	:	15
Practical	:	5+5
Total	**:**	**25**

B.2.2.Part I & PART III - Core Courses, Discipline Specific Elective Courses & Elective Courses

Components	**Internal Assessment Marks**	**External Examination Marks**	**Total Marks**
Theory	25	75	**100**

INTERNAL ASSESSMENT

Distribution of Marks

Theory

Mode of Evaluation			Marks
Internal Test		:	15
Assignment	K3 Level	:	5
Quiz	K2 Level	:	5
Total		**:**	**25**

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

Practical

Mode of Evaluation		Marks
Internal Test	:	30
Record & Performance	:	10
Total	**:**	**40**

Internal Test - Average of the best two will be considered

Question Pattern for Internal Tests **Duration: 2 Hours**

Section	Q. No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 4	Multiple Choice	4	4	1	4
B	5 -6	Internal Choice - Either … or Type	3	3	7	21
C	8 -9	Internal Choice - Either… or Type	2	2	10	20
					Total	**45***

*The total marks obtained in the Internal Test will be calculated for 15 marks

SUMMATIVE EXAMINATION

Question Pattern **Duration: 3 Hours**

Section	Q. No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 -10	Multiple Choice	10	10	1	10
B	11 - 15	Internal Choice – Either …or Type	5	5	7	35
C	16 - 18	Internal Choice – Either… or Type	3	3	10	30

	Total	**75**

B.2.3 PART IV - Skill Enhancement Courses, Non Major Elective Courses and Foundation Course

INTERNAL ASSESSMENT

Distribution of Marks

Theory

Mode of Evaluation			**Marks**
Internal Test		:	15
Assignment	K2 Level	:	5
Quiz	K2 Level	:	5
	Total	**:**	**25**

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

Question Pattern for Internal Tests **Duration: 1 Hour**

Section	**Q.No.**	**Types of Question**	**No. of Questions**	**No. of Questions to be answered**	**Marks for each Question**	**Total Marks**
A	1 - 3	Internal Choice - Either… or Type	3	3	5	15
B	4	Internal Choice – Either …or Type	1	1	10	10
					Total	**25**

Summative Examination

Mode of Evaluation		**Marks**
Summative Examination	:	50
Multiple Choice Questions (K2 Level)	:	25
Total	**:**	**75**

Question Pattern **Duration: 2 Hours**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either… or Type	5	5	6	30
B	6 - 7	Internal Choice – Either… or Type	2	2	10	20
					Total	**50**

B.2.6. Part V – Extension Activities

Assessment by Internal Examiner only

Distribution of Marks

Mode of Evaluation		Marks
Attendance	:	5
Performance	:	10
Report/Assignment/Project/Camp/Practical	:	10
Total	**:**	**25***

*The marks obtained will be calculated for 100 marks

ELIGIBILITY FOR THE DEGREE

- The candidate will not be eligible for the Degree without completing the prescribed Courses of study, lab work, *etc.*, and a minimum Pass marks in all the Courses.
  - No Pass minimum for Internal Assessment.
  - Pass minimum for External Examination is 27 marks out of 75 marks for Core Courses, Discipline Specific Elective Courses and Allied Courses.
  - Pass minimum for External Examination is 21 marks out of 60 marks for Skill Enhancement Courses and Non Major Elective Courses.
  - The aggregate minimum pass percentage is 40.
  - Pass minimum for External Practical Examination is 21 marks out of 60 marks.
  - Pass minimum for Ability Enhancement Compulsory Courses and Generic Elective Courses is 40 marks.
  - Pass minimum for Self Study Courses is 40 marks.

- Attendance
  - For UG, PG Programmes,
    a) The students who have attended the classes for 76 days (85%) and above are permitted to appear for the Summative Examinations without any condition.
    b) The students who have only 60-75 days (66% - 84%) of attendance are permitted to appear for the Summative Examinations after paying the required fine amount and fulfilling other conditions according to the respective cases.
    c) The students who have attended the classes for 59 days and less – upto 45 days (50% - 65%) can appear for the Summative Examinations only after getting special permission from the Principal.
    d) The students who have attended the classes for 44 days or less (<50%) cannot appear for the Summative Examinations and have to repeat the whole semester.
      - For Part V in UG Programmes, the students require 75 % of attendance to get a credit.
      - For Certificate, Diploma, Advanced Diploma and Post Graduate Diploma Programmes, the students require 75% of attendance to appear for the Theory/Practical Examinations.

    These rules come into effect from 2020-2021 onwards.

B.3 ASSESSMENT MANAGEMENT PLAN

An Assessment Management Plan that details the assessment strategy both at the Programme and the Course levels is prepared. The continuous assessment is implemented using an assessment rubric to interpret and grade students.

B.3.1 Assessment Process for CO Attainment

Assessment is one or more processes carried out by the institution that identify, collect and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the Continuous Internal Assessments and in End Semester Examination of a Course. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

Direct Assessment (Rubric based) - Conventional assessment tools such as Term Test, Assignment, Quiz and End Semester Summative Examination are used.

Indirect Assessment – Done through Course Exit Survey.

CO Assessment Rubrics

For the evaluation and assessment of COs and POs, rubrics are used. Internal assessment contributes 40% and End Semester assessment contributes 60% to the total attainment of a CO for the theory Courses. For the practical Courses, internal assessment contributes 50% and Semester assessment contributes 50% to the total attainment of a CO. Once the Course Outcome is measured, the PO can be measured using a CO-PO matrix.

CO Attainment

Direct CO Attainment

Course Outcomes of all Courses are assessed and the CO – wise marks obtained by all the students are recorded for all the assessment tools. The respective CO attainment level is evaluated based on set attainment rubrics.

Target Setting for Assessment Method

For setting up the target of internal assessment tools, 55% of the maximum mark is fixed as target. For setting up the target of End Semester Examination, the average mark of the class shall be set as target.

Formula for Attainment for each CO

Attainment = Percentage of students who have scored more than the target marks

$$\text{Percentage of Attainment} = \frac{\text{Number of Students who scored more than the Target}}{\text{Total Number of Students}} \times 100$$

Attainment Levels of COs

Assessment Methods	**Attainment Levels**	
Internal Assessment	Level 1	50% of students scoring more than set target marks in Internal Assessment tools
	Level 2	55% of students scoring more than set target marks in Internal Assessment tools
	Level 3	60% of students scoring more than set target marks in internal Assessment tools
End Semester Summative Examination	Level 1	50% of students scoring more than average marks in End Semester Summative Examination
	Level 2	55% of students scoring more than average marks in End Semester Summative Examination
	Level 3	60% of students scoring more than average marks in End Semester Summative Examination

Indirect CO Attainment

At the end of each Course, an exit survey is conducted to collect the opinion of the students on attainment of Course Outcomes. A questionnaire is designed to reflect the views of the students

about the Course Outcomes.

Overall CO Attainment= 75% of Direct CO Attainment + 25 % of Indirect CO Attainment

In each course, the level of attainment of each CO is compared with the predefined targets. If the target is not reached, the Course teacher takes necessary steps for the improvement to reach the target.

For continuous improvement, if the target is reached, the Course teacher can set the target as a value greater than the CO attainment of the previous year.

B.3.2 Assessment Process for Overall PO Attainment

With the help of CO - PO mapping, the PO attainment is calculated. PO assessment is done by giving 75% weightage to direct assessment and 25% weightage to indirect assessment. Direct assessment is based on CO attainment, where 75% weightage is given to attainment through End Semester Examination and 25% weightage is given to attainment through Internal assessments. Indirect assessment is done through Graduate Exit Survey and participation of students in Co-curricular/ Extra curricular activities.

PO Assessment Tools

Mode of Assessment	Assessment Tool	Description
Direct Attainment (Weightage -75%)	CO Assessment	This is computed from the calculated CO Attainment value for each Course
Indirect Attainment (Weightage - 25%)	Graduate Exit Survey 10%	At the end of the Programme, Graduate Exit Survey is collected from the graduates and it gives the opinion of the graduates on attainment of Programme Outcomes
	Co-curricular/ Extra-curricular activities 15%	For participation in Co-curricular/Extra-curricular activities during the period of their study.

Programme Articulation Matrix (PAM)

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Average Direct PO Attainment								
Direct PO Attainment in percentage								

Indirect Attainment of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Graduate Exit Survey							
Indirect PO Attainment							

Attainments of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Direct Attainment (Weightage - 75%)							
Indirect Attainment (Weightage - 25%)							
Overall PO Attainment							

Overall PO Attainment= 75% of Direct PO Attainment +
25% of Indirect PO Attainment (Graduate Exit Survey & Participation in Co- curricular and Extra curricular Activities)

Expected Level of Attainment for each of the Programme Outcomes

POs	Level of Attainment
Attainment Value ≥70%	Excellent
60% ≤ Attainment Value < 70%	Very Good
50% ≤ Attainment Value < 60%	Good
40% ≤ Attainment Value < 50%	Satisfactory
Attainment Value <40%	Not Satisfactory

Level of PO Attainment

Graduation Batch	Overall PO Attainment (in percentage)	Whether Expected Level of PO is Achieved? (Yes/No)

B.3.3 Assessment Process for PEOs

The curriculum is designed so that all the Courses contribute to the achievement of PEOs. The attainment of PEOs is measured after 5 years of completion of the Programme only through indirect methods.

Target for PEO Attainment

Assessment Criteria	Target (UG)	Target (PG)
Record of Employment	15% of the class strength	30% of the class strength
Progression to Higher Education	50% of the class strength	5% of the class strength
Record of Entrepreneurship	2% of the class strength	5% of the class strength

Attainment of PEOs

Assessment Criteria & Tool	Weightage
Record of Employment	10
Progression to Higher Education	20
Record of Entrepreneurship	10
Feedback from Alumnae	30
Feedback from Parents	10
Feedback from Employers	20
Total Attainment	**100**

$$\text{Percentage of PEO Attainment from Employment} = \frac{\text{Number of Students who have got Employment}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Higher Education} = \frac{\text{Number of Students who pursue Higher Education}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Entrepreneurship} = \frac{\text{Number of Students who have become Entrepreneurs}}{\text{Target}} \times 100$$

Expected Level of Attainment for each of the Programme Educational Objectives

POs	Level of Attainment
Attainment Value ≥70%	Excellent
60% ≤ Attainment Value < 70%	Very Good
50% ≤ Attainment Value < 60%	Good
40% ≤ Attainment Value < 50%	Satisfactory
Attainment Value <40%	Not Satisfactory

Level of PEO Attainment

Graduation Batch	Overall PEO Attainment (in percentage)	Whether Expected Level of PEO is Achieved? (Yes/No)

C. PROCESS OF REDEFINING THE PROGRMME EDUCATIONAL OBJECTIVES

The college has always been involving the key stakeholders in collecting information and suggestions with regard to curriculum development and curriculum revision. Based on the information collected, the objectives of the Programme are defined, refined and are inscribed in the form of PEOs. The level of attainment of PEOs defined earlier will be analysed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like Board of Studies, Academic Council and Governing Body may recommend appropriate actions. As per the Outcome Based Education Framework implemented from the Academic Year 2020 - 2021, the following are the Programme Structure, the Programme Contents and the Course Contents of B.Sc. Mathematics Programme.

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR - 626 001

BACHELOROF SCIENCE MATHEMATICS (2014)

Outcome Based Education with Choice Based Credit System
Programme Structure-Allotment of Hours and Credits
ForThose who join in the Academic Year 2023-2024

Components	Semester						Total Number of Hours/ Credits
	I	II	III	IV	V	VI	
Part I : Tamil/Hindi	6(3)	6(3)	6(3)	6(3)	-	-	24(12)
Part II : English	6(3)	6(3)	6(3)	6(3)	-	-	24(12)
Core Course	4(4)	4(4)	4(4)	4(4)	5(4)	6(4)	27(24)
Core Course	4(4)	4(4)	4(4)	4(4)	5(4)	6(4)	27(24)
Core Course	-	-	-	-	5(4)	6(4)	11(8)
Core Course	-	-	-	-	-	-	-
Core Course Practical	-	-	-	-	-	-	-
Core Course Project	-	-	-	-	1(1)	-	1(1)
DSEC	-	-	-	-	5(4)	5(4)	10(8)
DSEC	-	-	-	-	5(4)	5(4)	10 (8)
Elective Course I	4(3)	4(3)	-	-	-	-	8(6)
Elective Course I Practical I	2(1)	2(1)	-	--	-	-	4(2)
Elective Course II	-	-	6(4)	3(3)	-	-	9(7)
Elective Course II Practical II	-	-	-	2(1)	-	-	2(1)
Self Study Courses	-	-	-	-	-	0(1)	0(1)
Part IV: Skill Enhancement Courses, Non Major Elective Courses, Ability EnhancementCompulsory Courses, Generic Elective Courses and Internship/ Field Project							
SEC	2(2)	-	1(1)	-	-	-	3(3)
SEC	-	2(2)	2(2)	2(2)	2(2)	2(2)	10(10)
Non Major Elective	2(2)	2(2)	-	-	-	-	4(4)
AECC-Value Education	-	-	-	-	2(2)	-	2(2)
AECC-Environmental Studies	-	-	-	2(2)	-	-	2(2)
GEC	-	-	1(1)	-	-	-	1(1)
GEC	-	-	-	1(1)	-	-	1(1)
Self Study Course	-	-	-	-	0(1)	-	0(1)
Internship/ Field Project	-	-	-	0(1)	-	-	0(1)
Part V–Extension Activities	-	-	-	0(1)	-	-	0(1)
Total	**30 (22)**	**30 (22)**	**30 (22)**	**30 (25)**	**30 (26)**	**30 (23)**	**180 (140)**
Extra Credit Course (Self Study Course)	-	-	-	-	0(2)	-	0(2)

DSEC: Discipline Specific Elective Course; SEC– Skill Enhancement Course

AECC- Ability Enhancement Compulsory Courses; GEC-Generic Elective Courses

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B.Sc. MATHEMATICS - 2014

PROGRAMME CONTENT

SEMESTER I

2023-2024 onwards

S.No.	Components		Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1.	**Part I**		Tamil/Hindi	23UTAG11/ 23UHDG11	6	3	3	25	75	100
2.	**Part II**		English	23UENG11	6	3	3	25	75	100
3.	**Part III**	Core Course -1	Algebra &Trigonometry	23UMTC11	4	4	3	25	75	100
4.		Core Course -2	Differential Calculus	23UMTC12	4	4	3	25	75	100
5.		Elective Course -I	General Physics - I	23UPMA11	4	3	3	25	75	100
6.		Elective Course I Practical I	General Physics Practical I	23UPMA11P	2	1	3	40	60	100
7.	**Part IV**	NME – 1	Quantitative Aptitude I	23UMTN11	2	2	3	25	75	100
8		SEC-1 Foundation Course	Bridge Mathematics	23UMTF11	2	2	3	25	75	100
				Total	**30**	**22**				**800**

PROGRAMME CONTENT

SEMESTER II

S.No.	Components		Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1.	**Part I**		Tamil/Hindi	23UTAG21/ 23UHDG21	6	3	3	25	75	100
2.	**Part II**		English	23UENG21	6	3	3	25	75	100
3.	**Part III**	Core Course -3	Analytical Geometry (Two & Three Dimensions)	23UMTC21	4	4	3	25	75	100
4.		Core Course -4	Integral Calculus	23UMTC22	4	4	3	25	75	100
5.		Elective Course -I	General Physics - II	23UPMA21	4	3	3	25	75	100
6.		Elective Course I Practical II	General Physics Practical - II	23UPMA21P	2	1	3	40	60	100
7.	**Part IV**	NME- 2	Quantitative Aptitude II	23UMTN21	2	2	3	25	75	100
8		SEC – 2	Office Automation for Mathematics and DTP - Practical	23UMTS21P	2	2	3	40	60	100
				Total	**30**	**22**				**800**

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B.Sc. MATHEMATICS

(2023-2024 onwards)

Semester I	**ALGEBRA & TRIGONOMETRY**	Hours/Week:4	
Core Course – 1		Credits:4	
Course Code		Internal	External
23UMTC11		25	75

Course Outcomes:

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

CO1: retrieve the fundamental principles, concepts in the areas of Algebra and Trigonometry. [K1]

CO2: explain the concepts in reciprocal equations, binomial, exponential and logarithmic series. [K2]

CO3: illustrate the trigonometric functions, hyperbolic functions and logarithm of complex quantities. [K2]

CO4: determine the relationship between circular and hyperbolic functions and the summation of trigonometric series. [K3]

CO5: apply the knowledge gained in Algebra and Trigonometry to other fields. [K3]

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. (12 Hours)

UNIT II

Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems (12 Hours)

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. (12 Hours)

UNIT IV

Expansions of sin nθ, cos nθ in powers of sin θ, cos θ - Expansion of tan nθ 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 sin θ, cos θ

and tan θ in terms of θ - related problems. (12 Hours)

UNIT V

Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Summation of trigonometric series - Logarithm of complex quantities - related problems. (12 Hours)

TEXT BOOKS

1. T.K.Manickavachagom Pillay, T.Natarajan, K.S.Ganapathy, Algebra Volume – I (2015), S.Viswanathan Printers & Publishers Pvt.Ltd.
2. T.K.Manickavachagom Pillay, T.Natarajan, K.S.Ganapathy, Algebra Volume – II (2014), S.Viswanathan Printers & Publishers Pvt.Ltd.
3. T.K.Manickavachagom Pillay, S.Narayanan, Trigonometry (2015), S.Viswanathan Printers & Publishers Pvt.Ltd.

Unit	Chapters & Sections
Text Book 1	
I	6 – 16, 16.1, 16.2, 17,19,30
II	3 – 10 4 – 3, 3.1 , 5, 6, 7
Text Book 2	
III	2 – 8 to 16, 16.1 to 16.4
Text Book 3	
IV	3 – Full
V	4 – Full 5 – 5, 5.1, 5.2 6 – 1, 2, 3

Course Code 23UMTC11	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	2	3	2	2	1	1	-
CO2	3	3	2	2	3	2	2	1	1	-
CO3	3	3	2	2	3	2	2	1	1	-
CO4	3	3	2	2	3	2	2	1	1	-
CO5	3	3	2	2	3	2	2	1	1	-

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B.Sc. MATHEMATICS
(2023-24 onwards)

Semester I	**DIFFERENTIAL CALCULUS**	Hours/Week:4	
Core Course-2		Credits:4	
Course Code **23UMTC12**		Internal 25	External 75

Course Outcomes:

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

CO1: convey the fundamental concepts in differential calculus and its applications. [K1]

CO2: explain the method to find the higher order derivative and the curvature of a given curve. **[**K2]

CO3: find the envelope of a given family of curves. [K2]

CO4: apply the knowledge gained in calculus to other fields**.** [K3]

CO5: find the evolutes, involutes and radius of curvature using polar co-ordinates. [K3]

UNIT I

Successive Differentiation: Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product (12 Hours)

UNIT II

Partial Differentiation: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions. (12 Hours)

UNIT III

Partial Differentiation (Continued): Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers. (12 Hours)

UNIT IV

Envelope: Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter. (12 Hours)

UNIT V

Curvature: Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutes - Radius of Curvature in Polar Co-ordinates (12 Hours)

TEXT BOOKS

1. S.Narayanan, T.K.Manickavachagom Pillay, Calculus Volume – I (2018), S.Viswanathan Printers & Publishers Pvt.Ltd.

Unit	Chapters & Sections
I	3 – 1.1 to 1.6, 2.1
II	8 – 1.1 to 1.5
III	8 – 1.6, 1.7 4 – 4.1 5
IV	10 – 1.1 to 1.4
V	10 – 2.1 to 2.6

Course Code 23UMTC12	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	2	3	1	3	3	1	-
CO2	3	2	2	2	3	1	3	3	1	-
CO3	3	2	1	2	3	1	3	2	1	-
CO4	3	2	1	2	3	2	3	2	1	-
CO5	3	2	1	2	3	2	3	2	1	-

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B.Sc. MATHEMATICS
(2023 -2024 onwards)

Semester I	**GENERAL PHYSICS – I**	Hours/Week: 4	
Elective Course I		Credits: 3	
Course Code 23UPMA11		Internal 25	External 75

COURSE OUTCOMES

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

CO1: identify basic laws and principles of wave motion, thermodynamics, electromagnetism, digital electronics and elastic constants [K1]

CO2: describe experimental methods involved in oscillations, ultrasonics, liquefaction of gases, measurement of physical & electrical parameters and realization of basic gates using universal gates [K2]

CO3: derive Physical parameters involved in oscillations, moduli of materials, Poiseuille's formula, heat engines, electromagnetism [K2]

CO4: illustrate the real-life applications of SHM, ultrasonic waves, low temperature physics and alternating current [K3]

CO5: apply the learned concepts to solve simple the problems in properties of matter, thermodynamics, electricity and magnetism. [K3]

UNIT I

WAVES, OSCILLATIONS AND ULTRASONICS: Simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – lithotripsy, ultrasonography – ultrasonic imaging- ultrasonics in dentistry – physiotheraphy, opthalmology – advantages of noninvasive surgery – ultrasonics in green chemistry. (12 hours)

UNIT II

PROPERTIES OF MATTER: *Elasticity*: elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum.

***Viscosity*:** streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula – comparison of viscosities – burette method.

***Surface tension*:** definition – molecular theory - Droplets formation–shape, size and lifetime – COVID transmission through droplets, saliva – drop weight method – interfacial surface tension. (12 hours)

UNIT III

HEAT AND THERMODYNAMICS: Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde's process of liquefaction of air– Liquid Oxygen for medical purpose– importance of cryocoolers- thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy – change of entropy in reversible and irreversible process. (12 hours)

UNIT IV

ELECTRICITY AND MAGNETISM: Potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit - types of switches in household and factories– Smart wifi switches- fuses and circuit breakers in houses.

(12 hours)

UNIT V

DIGITAL ELECTRONICS: Logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification. (12 hours)

ASSIGNMENT/ SEMINAR (NOT INCLUDED IN EXAM)

1. Droplets formation–shape, size and lifetime – COVID transmission through droplets, saliva – drop weight method – interfacial surface tension.
2. Liquid Oxygen for medical purpose– importance of cryocoolers
3. Types of switches in household and factories– Smart wifi switches- fuses and circuit breakers in houses.

TEXT BOOKS

1. R.Murugesan, (2018), *Allied Physics*, S. Chand & Co, New Delhi.
2. Brijlal and N. Subramanyam (1994), *Waves and Oscillations*, Vikas Publishing House, New Delhi.
3. Brijlal and N. Subramaniam (1994), Properties of Matter, S.Chand & Co., New Delhi.

REFERENCE BOOKS

1. Resnick Halliday and Walker (2018). *Fundamentals of Physics* (11th Edition), John Willey and Sons. Asia Pvt. Ltd., Singapore.
2. N.S. Khare and S.S. Srivastava (1983), *Electricity and Magnetism*, 10th Edition., Atma Ram & Sons, New Delhi.

WEB LINKS

1. https://youtu.be/M_5KYncYNyc
2. https://youtu.be/ljJLJgIvaHY
3. https://youtu.be/7mGqd9HQ_AU
4. https://youtu.be/h5jOAw57OXM
5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/
6. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://www.youtube.com/watch?v=gT8Nth9NWPM https://www.youtube.com/watch?v=9mXOMzUruMQ&t=1shttps://www.youtube.com/watch?v=m4u-SuaSu1s&t=3shttps://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work

Course Code 23UPMA11	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	2	-	-	2	-	2
CO 2	3	3	2	2	-	-	2
CO 3	3	2	2	2	-	-	-
CO 4	3	3	3	2	2	-	-
CO 5	3	3	3	2	2	-	-

Strong (3) Medium (2) Low (1)

Dr.A.Azhagu Parvathi — Head of the Department

Dr.R. Hemalatha — Course Designer

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B.Sc. MATHEMATICS
(2023 -2024 onwards)

Semester I	**GENERAL PHYSICS PRACTICAL I**	Hours/Week: 2	
Elective Course I Practical I		Credits: 1	
Course Code 23UPMA11P		Internal 40	External 60

COURSE OUTCOMES

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

CO1: understand the theoretical concepts in Mechanics and Properties of matter, Heat and Electronics related experiment and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram /experimental set up with tabular column/model graph and write the formula to calculate the required physical parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula/graph and complete the record work [K3]

CO5: assess the accuracy of the results obtained and compare it with the theoretical value. [K3]

Minimum of seven experiments from the list:

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever, scale and telescope
3. Rigidity modulus by torsional oscillations without mass
4. Surface tension and interfacial Surface tension – drop weight method
5. Verification of laws of transverse vibrations using sonometer
6. Calibration of low range voltmeter using potentiometer

7. Verification of truth tables of basic logic gates using ICs
8. Verification of De Morgan's theorems using logic gate ICs.
9. Use of NAND as universal building block.

Course Code 23UPMA11P	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO 1	3	3	2	-	2	-	2
CO 2	3	3	3	-	-	-	1
CO 3	3	3	3	2	-	3	3
CO 4	3	3	3	2	2	2	3
CO 5	3	2	2	2	2	2	3

Strong (3) Medium (2) Low (1)

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Head of the Department

Dr. R. Hemalatha
Course Designer

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B.Sc. MATHEMATICS

(2023-24 onwards)

Semester I	**QUANTITATIVE APTITUDE I**	Hours/Week: 2	
NME -1		Credits: 2	
Course Code **23UMTN11**		Internal 25	External 75

Course Outcomes:

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

CO1: recall the basic formulae in Mathematics. [K1]

CO2: recognize the applications of Mathematics in real life. [K1]

CO3: describe short-cut methods in solving problems. [K2]

CO4: identify solutions to various arithmetic problems using short cut methods. [K2]

CO5: apply their analytical ability and computational skills in solving the problems. [K3]

UNIT I

Simplifications - Averages (6 hours)

UNIT II

Problem on Numbers (6 hours)

UNIT III

Percentage (6 hours)

UNIT IV

Profit and Loss (6 hours)

UNIT V

Time and Work (6 hours)

TEXT BOOK

Aggarwal, R.S. (7th Fully Revised Edition 2014). *Quantitative Aptitude*, S.Chand & Company Ltd.

Unit	Chapter Section I Arithmetical Ability	Section
I	4,6	Examples only
II	7	Examples, Exercise (1 – 15)
III	10	Examples, Exercise (1 – 15)
IV	11	Examples only
V	15	Examples , Exercise (1 – 15)

REFERENCE BOOKS

1. U. Mohan Rao, Quantitative Aptitude for Competitive Examinations, Scitech Publications, 2016.

2. Dr. M. Manoharan, Dr. C. Elango and Prof K. L. Eswaran, Business Mathematics, Palani paramount Publications, Reprint 2013

Course Code 23UMTN11	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	1	-	-
CO2	3	2	2	3	1	-	-
CO3	3	1	3	3	1	-	-
CO4	3	2	3	3	1	-	-
CO5	3	2	3	3	2	-	-

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Dr.P.Geetha
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B.Sc. MATHEMATICS

(2023-24 onwards)

Semester I	**BRIDGE MATHEMATICS**	Hours/Week: 2	
SEC-1 Foundation Course		Credits: 2	
Course Code **23UMTF11**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: recall the basic formulae in Trigonometry and Calculus [K1]

CO2: retrieve the fundamental principles and the concepts in the areas of Algebra. [K1]

CO3: explain the basic concepts in Algebra, Calculus and Trigonometry. [K2]

CO4: find various trigonometric ratios for different angles, limits, derivatives, definite and indefinite integrals of a given function. [K2]

CO5: illustrate the concepts in Calculus, Trigonometry and Algebra. [K2]

UNIT I

Binomial theorem, Sequences and Series

Introduction - Binomial theorem – Particular Cases of Binomial theorem (6 hours)

UNIT II

Binomial theorem, Sequences and Series

Finite Sequences – Finite Series – Infinite Sequences and Series

Combinatorics and Mathematical Induction

Permutations – Combinations (6 hours)

UNIT III

Trigonometry

A recall of basic results – Sum and Difference Identities (or) Compound Angles formulas - Multiple Angle Identities and Submultiple Angle Identities - Product to Sum and Sum to

Product identities – Law of Sines – Law of Cosines - Inverse Trigonometric functions.

(6 hours)

UNIT IV

Differential Calculus – Limits and Continuity

Limits

Differential Calculus – Differentiability and Methods of Differentiation

The Concept of derivative – Differentiation rules (6 hours)

UNIT V:

Integral Calculus

Basic Rules of Integration - Properties of Integrals (6 hours)

TEXT BOOK:

1. Tamilnadu State Board Mathematics text books of class XI

Unit	**Chapters & Sections**
Volume I	
I	5 – 5.1 to 5.3
II	5 – 5.4 to 5.6
	4 – 4.4, 4.5
III	3 – 3.2, 3.5.1,3.5.2,3.5.3, 3.7.1,3.7.2, 3.9
Volume II	
IV	9 – 9.2
	10 – 10.2. 10.4
V	11 – 11.3,11.5

Course Code 23UMTF11	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	3	3	2	3	1	-	-
CO2	3	3	2	3	3	2	3	1	-	-
CO3	3	3	2	3	3	2	3	1	-	-
CO4	3	3	2	3	3	2	3	1	-	-
CO5	3	3	2	3	3	2	3	1	-	-

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B.Sc. MATHEMATICS

(2023-24 onwards)

Semester II	**ANALYTICAL GEOMETRY (TWO & THREE DIMENSIONS)**	Hours/Week:4	
Core Course-3		Credits:4	
Course Code **23UMTC21**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: list the different forms of equations of planes, straight lines, conics and sphere. [K1]

CO2: explain the basic concept of straight lines, planes, conics, plane and line, angle between two planes and sphere. [K2]

CO3: describe the properties of straight lines, conics, planes, plane and line and sphere. [K2]

CO4: solve problems in straight lines, conics, planes and sphere. [K3]

CO5: apply the knowledge gained in Analytical Geometry to other fields. [K3]

UNIT I

Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter. (12 Hours)

UNIT II

Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola. (12 Hours)

UNIT III

System of Planes-Length of the perpendicular–Orthogonal Projection. (12 Hours)

UNIT IV

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. (12 Hours)

UNIT V

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. (12 Hours)

TEXT BOOKS

1. P.Duraipandian , Analytical Geometry of 2D, Muhil publishers

2. Shanthi Narayan and Dr.P.K. Mittal ,Analytical Solid Geometry of 3D ,S.Chand & amp; Co. Pvt.Ltd.

Unit	Chapter	Section
Text Book1		
I	10	10.1 – 10.4
II	10	10.5 – 10.8
Text Book2		
III	2	2.1 – 2.10
IV	3	3.1 – 3.8
V	6	6.1 – 6.8

Course Code 23UMTC21	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	3	3	2	3	3	1	-	
CO2	3	3	3	3	3	2	3	1	1	-
CO3	3	3	3	3	3	2	2	1	1	-
CO4	3	3	2	2	3	3	2	1	1	-
CO5	3	2	2	3	2	2	3	1	1	-

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B.Sc. MATHEMATICS

(2023-2024 onwards)

Semester II	**INTEGRAL CALCULUS**	Hours/Week:4	
Core Course-4		Credits:4	
Course Code **23UMTC22**		Internal 25	External 75

COURSEOUTCOMES

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

CO1: convey the fundamental concepts in integral calculus and its applications. [K1]

CO2: explain the properties of various integrals, Beta and Gamma functions and their applications. [K2]

CO3: find the areas of curved surfaces and volumes of solids of revolution. [K2]

CO4: solve the problems of integration using Beta and Gamma functions. [K3]

CO5: apply integration techniques in higher mathematics. [K3]

UNIT I

Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration ofproduct of powers of algebraic and logarithmic functions - Bernoulli's formula. (12 Hours)

UNIT II

Multiple Integrals - definition of double integrals -evaluation of double integrals – double integrals in polar coordinates - Change of order of integration. (12 Hours)

UNIT III

Triple integrals –applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces–change of variables - Jacobian. (12 Hours)

UNIT IV

Beta and Gamma functions – infinite integral -definitions–recurrence formula of Gamma functions (12 Hours)

UNIT V

Properties of Beta and Gamma functions- relation between Beta and Gamma functions - Applications. (12 Hours)

TEXTBOOK

S.Narayanan and T.K Manicavachagom Pillay, Calculus Volume II (2007), S.Viswanathan, Publishers.

Unit	Chapter	Section
I	1	13 – 13.1 – 13.10, 14, 15.1
II	5	1, 2.1,2.2, 3.1
III	5	4, 5.1 – 5.3, 6.1 – 6.3, 7
	6	1.1 ,1.2, 2.1 – 2.4
IV	7	1.1 – 1.4, 2.1, 2.3
V	7	3 - 6

Course Code 23UMTC22	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	2	3	2	2	1	1	-
CO2	3	2	2	1	2	1	1	1	2	-
CO3	3	2	2	1	2	1	1	1	2	-
CO4	3	2	1	1	3	1	1	1	2	-
CO5	3	2	2	1	3	1	1	1	1	-

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B.Sc. MATHEMATICS
(2023 -2024 onwards)

Semester II	**GENERAL PHYSICS –II**	Hours/Week: 4	
Elective Course I		Credits: 3	
Course Code 23UPMA21		Internal 25	External 75

COURSE OUTCOMES

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

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

CO1: state basic concepts of physical optics, atom models, nuclear energy, relativity and electronics [K1]

CO2: derive physical parameters related to physical optics, nuclear energy and relativity [K2]

CO3: describe experimental methods involved in physical optics, atom models, gravitational waves and junction diodes [K2]

CO4: illustrate the real-life applications of physical optics, photoelectric effect, nuclear energy and electronics [K3]

CO5: apply the learned concepts to solve the problems in physical optics, atom models, nuclear energy and relativity [K3]

UNIT I

OPTICS: interference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge - Newton's rings – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – Laurent's Half shade polarimeter. (12hours)

UNIT II

ATOMIC PHYSICS: atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect – Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric

equation - Applications of photoelectric effect: solar cells, solar panels, optoelectric devices. (12 hours)

UNIT III

NUCLEAR PHYSICS: nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses –controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor. (12 hours)

UNIT IV

INTRODUCTION TO RELATIVITY: frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence. (12 hours)

UNIT V

SEMICONDUCTOR PHYSICS: p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger –introduction to e-vehicles and EV charging stations. (12 hours)

SELF STUDY

1. Applications of photoelectric effect: solar cells, solar panels, optoelectric devices.

ASSIGNMENT/SEMINAR (Not Included in Exam)

1. USB cell phone charger –introduction to e-vehicles and EV charging stations.

TEXT BOOK

1. R. Murugesan, (2017) *Allied Physics*, S. Chand & Co, New Delhi
2. K. Thangarajan and D.Jayaraman, (2004) *Allied Physics*, Popular Book Depot, Chennai
3. Brijlal and N.Subramanyam, (2002) *Textbook of Optics* S. Chand &Co, NewDelhi
4. R. Murugesan, *Modern Physics,* (2005) S.Chand &Co, NewDelhi
5. A. Subramaniyam, *Applied Electronics*, (2001) 2nd Edn., National Publishing Co.,Chennai.

REFERENCE BOOKS

1. Resnick Halliday and Walker (2018), *Fundamentals of Physics*, 11thEdn. John Willey and Sons, Asia Pvt. Ltd., Singapore.
2. D.R. Khanna and H.R. Gulati (1979). *Optics*, S. Chand & Co. Ltd., New Delhi.
3. Arthur Beiser, (1997). *Concepts of Modern Physics,* Tata McGraw Hill Publication, New Delhi.

4. Thomas L. Floyd (2017). *Digital Fundamentals*, 11th Edition, Universal Book Stall, New Delhi.
5. V.K. Metha, (2004). *Principles of electronics*, 6th Edition. S. Chand and Company, New Delhi.

Course Code 23UPMA21	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO 1	3	2	-	-	2	-	2
CO 2	3	3	2	2	-	-	2
CO 3	3	2	2	2	-	-	-
CO 4	3	3	3	2	2	-	-
CO 5	3	3	3	2	2	-	-

Strong (3) Medium (2) Low (1)

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B.Sc. MATHEMATICS
(2023 -2024 onwards)

Semester II	**GENERAL PHYSICS PRACTICAL -II**	Hours/Week: 2	
Elective Course I – Practical II		Credits: 1	
Course Code 23UPMA21P		Internal 40	External 60

COURSE OUTCOMES

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

CO1: understand the theoretical concepts in Magnetism, Optics, Electronics and formulate the experimental procedure [K2]

CO2: draw the circuit diagram /experimental set up with tabular column/model graph and write the formula to calculate the required physical parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula/graph and complete the record work [K3]

CO5: assess the results obtained and compare it with the theoretical value [K3]

Minimum of seven Experiments from the list:

1. Radius of curvature of lens by forming Newton's rings
2. Thickness of a wire using air wedge
3. Determination of AC frequency using sonometer
4. Thermal conductivity of poor conductor using Lee's disc
5. LCR – Series Resonance – Determination of L.
6. Characterization of Zener diode
7. Study of output voltages of Bridge Rectifier.
8. Construction of AND, OR, NOT gates using diodes and transistor
9. NOR gate as a universal building block

Course Code 23UPMA21P	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO 1	3	3	2	-	2	-	2
CO 2	3	3	3	-	-	-	1
CO 3	3	3	3	2	-	3	3
CO 4	3	3	3	2	2	2	3
CO 5	3	2	2	2	2	2	3

Strong (3) Medium (2) Low (1)

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B.Sc. MATHEMATICS

(2023-24 onwards)

Semester II	**QUANTITATIVE APTITUDE II**	Hours/Week: 2	
NME - 2		Credits: 2	
Course Code **23UMTN21**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: retrieve the basic concepts in arithmetic problems. [K1]

CO2: understand the application of Mathematics in real life. [K1]

CO3: explain the various techniques involved in aptitude problems. [K2]

CO4: explain the shortcut methods of finding solutions to problems. [K2]

CO5: apply their analytical ability and computational skills in solving problems. [K3]

Unit I

Problem on Ages (6 hours)

Unit II

Ratio and Proportion (6 hours)

Unit III

Simple Interest (6 hours)

Unit IV

Calendar (6 hours)

Unit V

Permutations and Combinations (6 hours)

TEXT BOOK

Aggarwal, R.S. (7th Fully Revised Edition 2014). *Quantitative Aptitude*, S. Chand & Company Ltd.

REFERENCE BOOKS

1. Abhijit Guha-(6th reprint 2006) Quantitative Aptitude for Competitive Examinations-3rd edition, Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Ashish Aggarwal-(2014) Quick Arithmetic-1st edition, S.Chand & Company Ltd., New Delhi.

Unit	Chapter Section I Arithmetical Ability	Section
I	8	Examples, Exercise (1 – 20)
II	12	Examples, Exercise (1 – 30)
III	21	Examples, Exercise (1 – 20)
IV	27	Full
V	30	Full

Course Code 23UMTN21	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	1	-	-	-
CO2	3	2	2	3	1	-	-	-
CO3	3	1	3	3	1	-	-	-
CO4	3	2	3	3	1	-	-	-
CO5	3	2	3	3	2	-	-	-

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B.Sc. MATHEMATICS

(2023-24 onwards)

Semester II	**OFFICE AUTOMATION FOR MATHEMATICS AND DTP - PRACTICAL**	Hours/Week:2	
SEC-2		Credits:2	
Course Code		Internal	External
23UMTS21P		40	60

COURSE OUTCOMES

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

CO1 : explain the components of computer and basics of office automation software. [K2]

CO2 : demonstrate the working of windows operating system. [K2]

CO3: apply the acquired skills to design the documents. [K3]

CO4: demonstrate different types of charts in MS-Excel. [K3]

CO5: apply their creativity skill in power point presentation. [K3]

LIST OF PROGRAMS

Office Automation Practical

1. Design a document using MS – Word with different font style, different font size and Header and Footer.
2. Design the class Time Table in MS-Word.
3. Send interview cards to four candidates using Mail Merge in MS–Word.
4. Create yearly salary report using Mathematical Functions in MS-Excel.
5. Create different types of chart in MS-Excel.
6. Design a MS – power point slide for the relationship between the roots and coefficients of the equation $a_0x^n + a_1x^{n-1} + \cdots + a_n = 0$. and also discuss the nature of the roots of $ax^2 + bx + c = 0$ by using equation editor.

Corel DRAW Practical

1. Create your own cool custom CD cover.
2. Create a stylish visiting card.
3. Create a logo for Institution.
4. Design a Greeting card.

TEXT BOOKS

1. Dinesh Maidasani, (2011). *Learning Computer Fundamentals*, MS Office and Internet &Web Technology, Third Edition, Firewall Media.
2. Vikas Gupta, Dream, (2007). *Comdex DTP Course Kit*, Tech Publisher.

Course Code 23UMTS21P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	2	2	2	1	2	1	1
CO2	3	3	1	2	2	2	1	3	3	2
CO3	3	3	2	2	2	2	1	2	1	1
CO4	3	3	2	1	1	2	1	2	2	1
CO5	3	3	3	1	1	2	1	2	1	-

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