V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM

REGULATIONS AND SYLLABUS

(with effect from Academic Year 2024 - 2025)

V.V.Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 13 UG Programmes (Aided), 15 UG Programmes (SF), 15 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 and 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

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, Data Science, 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, Biotechnology, Computer Science, Computer Science (Data Science) and Computer Applications (MCA) *
Commerce & Management	:	Commerce, Business Administration (MBA) *
		* AICTE approved Programmes

OUTLINE OF CHOICE BASED CREDIT SYSTEM- PG

1. Core Courses
2. Elective Courses
   - Discipline Specific Elective Courses (DSEC)
   - Generic Elective Courses
   - Non-Major Elective Course (NMEC)
3. Skill Enhancement Courses
4. Self Study Course (Online)
5. Extension Activity
6. Extra Credit Courses (Optional)

List of Non Major Elective Courses (NME)
(2024-2025 onwards)

PG PROGRAMMES

Name of the Course	Course Code	Department
Introduction to Epigraphy	24PHIN21	History
Functional English	24PENN21	English
தமிழ் இலக்கிய வரலாறு	24PTAN21	Tamil
Taxation Concepts and Assessment	24PCON21	Commerce
Entrepreneurship Development	24PBAN21	Business Administration
Mathematics for Life Sciences	24PMTN21	Mathematics
Solid Waste Management	24PPHN21	Physics
Chemistry in Everyday Life	24PCHN21	Chemistry
Food Preservation	24PHSN21	Home Science - Nutrition and Dietetics
Nutritional Biochemistry	24PBCN21	Biochemistry
Tissue engineering	24PBON21	Biotechnology
Web Programming	24PCSN21	Computer Science
Fundamentals of Web Design	24PCAN21	Computer Applications

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 of the Department of Computer Applications

To impart knowledge of Computer Applications for bringing out competent computing professionals with virtuous values and social responsibilities.

Mission of the Department of Computer Applications

- To provide equitable access to high-grade and value-based education in computer applications for students.
- To nurture their skills to design and develop systems for real life problems.
- To facilitate consultancy service to the corporate and foster research.
- To develop skills knowledgeably to meet the ever-changing needs of society.

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 M.C.A Programme The Students will be able to

- develop technical competence in various functional domains of computer applications.
- analyze real life problems, design computing systems appropriate to its solutions thatare technically sound, economically feasible and socially acceptable.
- exhibit entrepreneurial skills and find novel solutions through technological based research.
- continue a lifelong professional development in computing that contributes innovative methodologies to solve complex problems for the betterment of the society

Key Components of Mission Statement	PEO1	PEO2	PEO3	PEO4
high-grade, value-based education	√	-	√	-
design and develop systems	√	√	√	√
consultancy service and research	-	√	√	√
meet the ever-changing needs of society.	√	√	-	√

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 their in-depth domain knowledge and practical skills in interdisciplinary fields for research-based endeavours, employment and entrepreneurship development. (*Disciplinary Knowledge)*

2 communicate proficiently and confidently with the ability to present complex ideas both in spoken and written forms in a concise manner to assorted groups. (*Communication Skills*)

3 identify, formulate and solve problems in a consistent and systematic way with updated skills using modern tools and techniques. (*Scientific Reasoning and Problem Solving*)

4 analyze the data, synthesis the findings and provide valid conclusion by critical evaluation of theories, policies and practices for the fulfillment of the local, national, regional and global developmental needs. (*Critical Thinking and Analytical Reasoning*)

5 explore and evaluate globally competent research methodologies to apply appropriately in interdisciplinary research; Develop and sustain the research capabilities to meet the emerging needs for the welfare of the society. (*Research Related Skills*)

6 use ICT to mould themselves for lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning*)

7 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*)

8 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 PG 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 Successful completion of M.C.A Programme, the students will be able to

PO 1: *Disciplinary Knowledge*

> **PSO 1.a:** Apply in depth knowledge of Computer Applications to analyze and design system that can provide more economic and affordable solutions in multidisciplinary environments and productively engage in research..

> **PSO 1.b:** Make use of their professional skills in Computer Applications in obtaining jobs thereby becoming responsible citizens.

PO2: *Communication Skills*

> **PSO 2a:** Communicate efficiently the selected suitable data model, appropriate architecture and platform to implement a system with a range of audiences through well-organized, precise, and effective oral presentations.

> **PSO 2b:** Communicate effectively with the computing community as well as society by being able to comprehend effective documentations with presentations.

PO3: *Scientific Reasoning and Problem Solving*

> **PSO 3:** Identify and define problems and issues, recognizing their complexity, considering alternative viewpoints and solutions to the real world problems using latest techniques for sustainable environment.

PO4: *Critical thinking and Analytical Reasoning*

> **PSO 4:** Investigate complex problems by employing analysis, interpretation and evaluation of data in the domain areas such as Machine learning, Digital Image Processing, IoT, Cloud Computing, Security, Business Intelligence and Big Data Analytics to provide valid conclusion for nation building.

PO5: *Research Related Skills*

> **PSO 5:** Develop research capability by utilizing modern computer technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and contribute towards society.

PO6: *Digital Literacy, Self - directed and Lifelong learning*

> **PSO 6:** Make use of latest ICT tools to develop effective e-content for problematic topics and engage in self-directed and lifelong learning with strong fundamentals in computer science, analytics, programming and problem solving.

PO7: *Cooperation/Team Work and Multicultural Competence*

> **PSO 7:** Work professionally with positive attitude as an individual or in multidisciplinary teams and communicate effectively.

PO8: *Moral and Ethical awareness*

PSO 8: Use of recent technology, skill and knowledge for computing practice with commitment on societal, moral and ethical values.

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	✓	✓	✓
PO2/PSO2	✓	✓	✓
PO3/PSO3	✓	✓	✓
PO4/PSO4	✓	✓	-
PO5/PSO5	-	✓	✓
PO6/PSO6	✓	✓	✓
PO7/PSO7	✓	✓	✓
PO8/PSO8	✓	✓	-

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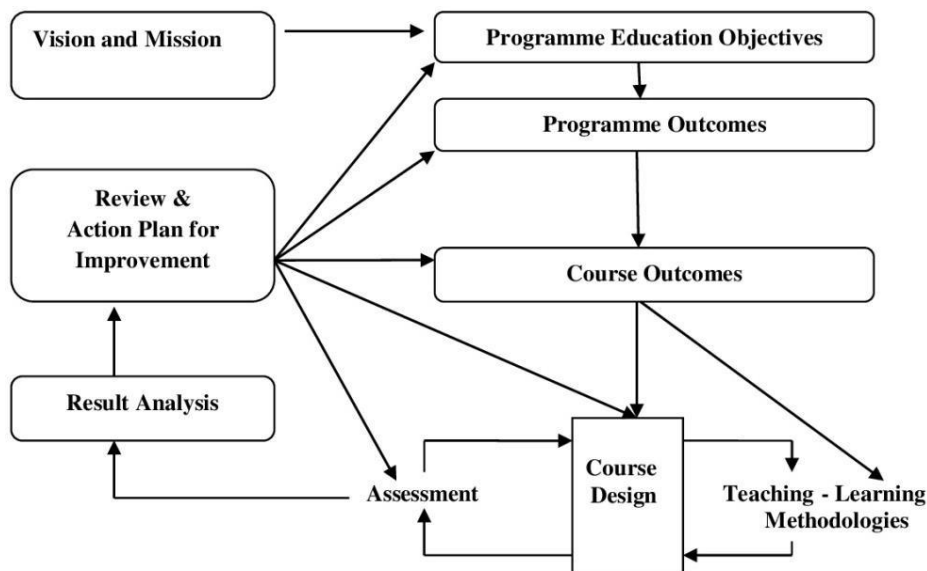
It is important to determine the methods of assessment. A comprehensive assessment strategy may be outlined using the revised Bloom's Taxonomy levels.

BLOOM'S TAXONOMY
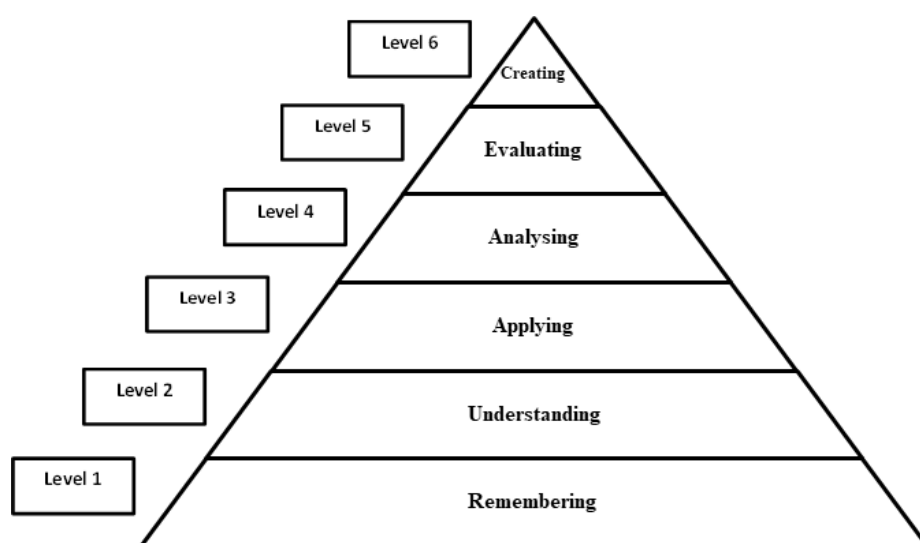
CO - PO Mapping of Courses

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	PO8/ PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

ELIGIBILITY FOR ADMISSION

a) The candidate should have passed in BCA/ Bachelor Degree in Computer Science or equivalent Degree from any recognized University. Obtained atleast 50% marks (45% in case of candidate belonging to reserved category) in the qualifying Examination.

(OR)

b) The candidate should have passed in B.Sc./ B.Com./ B.A. with Mathematics at 10+2 Level or at Graduation Level from any recognized University. Obtained atleast 50% (45% in case of candidate belonging to reserved category) in the qualifying Examination.

DURATION OF THE PROGRAMME

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

MEDIUM OF INSTRUCTION

English

B.2 EVALUATION SCHEME

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

B.2.1.Core Courses, Elective Courses (Discipline Specific Elective Courses, Generic Elective Courses & Non Major Elective Courses

INTERNAL ASSESSMENT
Distribution of Marks
Theory

Mode of Evaluation		Marks
Periodic Test	:	20
Assignment	:	5
Total	**:**	**25**

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

Practical

Mode of Evaluation		Marks
Periodic Test	:	30
Record Performance	:	10
Total	:	40

Periodic Test   - Average of the best two will be considered
Performance   - Attendance and Record

Question Pattern for Periodic Test   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	Multiple Choice Questions Only	5	5	1	5
B	6-9	Internal Choice – Either… or Type	4	4	5	20
C	10 - 11	Internal Choice – Either…. or Type	2	2	10	20
					Total	45*

*The total marks obtained in the Periodic Test will be calculated for 20 marks

Summative Examination
External Assessment
Distribution of Marks

Mode of Evaluation		Marks
Summative Examination	:	60
Seminar Presentation	:	15
Total	:	75

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 - 5	Multiple Choice Questions Only	5	5	1	5
B	6 - 10	Internal Choice – Either ….or Type	5	5	5	25
C	11 - 13	Internal Choice - Either …or Type	3	3	10	30
					Total	**60**

B.2.2 Project

Individual Project is compulsory for II PG Students in IV Semester.

Distribution of Marks

Mode of Evaluation		Marks
Internal Assessment	:	40
External Examination	:	60
Total	**:**	**100**

Internal Assessment: Pre-submission Presentation   - 10 Marks
Review Report   - 20 Marks
One Open Online Course related to the Project   - 10 Marks
External Examination: Project Report   - 40 Marks
Viva Voce   - 20 Marks

B.2.3. SKILL ENHANCEMENT COURSES
INTERNAL ASSESSMENT
Distribution of Marks
Theory

Mode of Evaluation		Marks
Periodic Test	:	20
Assignment	:	5
Total	**:**	**25**

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

Practical

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

Periodic Test   - Average of the best two will be considered
Performance   - Attendance and Record

Question Pattern for Periodic Test   **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	Internal Choice – Either… or Type	4	4	5	20
B	5	Internal Choice – Either… or Type	1	1	10	10
					Total	**30***

*The total marks obtained in the Periodic Test will be calculated for 20 marks

Summative Examination
  External Assessment
  Distribution of Marks

Mode of Evaluation		Marks
Seminar Paper		10
Seminar Presentation	:	15
Summative Examination	:	50
Total	:	75

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 - 5	Multiple Choice Questions Only	5	5	1	5
B	6 - 10	Internal Choice - Either ….or Type	5	5	5	25
C	11 - 12	Internal Choice - Either …or Type	2	2	10	20
					Total	50

B.2.3.1. Skill Enhancement Course - Professional Competency Skill

Types of Question – Multiple Choice Questions Only
INTERNAL ASSESSMENT
 Distribution of Marks
   Theory

Mode of Evaluation		Marks
Periodic Test	:	20
Assignment	:	5
Total	**:**	**25**

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

Question Pattern for Periodic Test   **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	Multiple Choice Questions Only	5	5	1	5
B	6-9	Internal Choice – Either… or Type	4	4	5	20
C	10 - 11	Internal Choice – Either…. or Type	2	2	10	20
		Total				**45***

*The total marks obtained in the Periodic Test will be calculated for 20 marks

Summative Examination
External Assessment
Distribution of Marks

Mode of Evaluation		Marks
Summative Examination	**:**	60
Seminar Presentation	**:**	15
Total	**:**	**75**

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 - 5	Multiple Choice Questions Only	5	5	1	5
B	6 - 10	Internal Choice - Either ….or Type	5	5	5	25
C	11 - 13	Internal Choice - Either …or Type	3	3	10	30
					Total	**60**

B.2.4. Self Study - Online Course

Practice for SET/NET-General Paper -Online
Internal Examination only

- Two Periodic Tests (Online) with Multiple Choice Questions will be conducted in III Semester.

- Model Examination will be conducted after two periodic tests.

Distribution of Marks

Mode of Evaluation		Marks
Periodic Test	:	25
Model Examination	:	75
Total	**:**	**100**

Two Periodic Tests - Better of the two will be considered

B.2.5. Extension Activities

Assessment by Internal Examiner only

Distribution of Marks

Mode of Evaluation		Marks
Attendance	:	5
Performance	:	10
Report	:	10
Total	**:**	**25***

*The marks obtained will be calculated for 100 marks

B.2.6. EXTRA CREDIT COURSES (OPTIONAL)

2.6.1 Extra Credit Course offered by the Department.
Assessment by Internal Examiner Only (To be conducted along with the III Periodic Test)
Distribution of Marks

Mode of Evaluation		Marks
Quiz (Multiple Choice Questions)	:	25
Model Examination	:	75
Total	**:**	**100**

Question Pattern for Model Examination

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q.No.(1-5)	Internal Choice-Either or Type	5	5	7	35
B Q.No.(6-9)	Internal Choice-Either or Type	4	4	10	40
				Total	**75**

2.6.2 Extra credit Course offered by MOOC (Massive Open Online Course)

➢ The Courses shall be completed within the first III Semesters of the Programme.

➢ The allotment of credits is as follows **(Maximum of 15 credits)**

        4weeks Course   - 1 credit

        8 weeks Course   - 2 credits

        12 weeks Course   - 3 credits

ELIGIBILITY FOR THE DEGREE

- The candidate will not be eligible for the Degree without completing the prescribedCourses of study and a minimum of 50% Pass marks in all the Courses.

➢ No Pass minimum for Internal Assessment for other Courses.

➢ Pass minimum for External Examination is 27 marks out of 60 marks for Core Courses, Discipline Specific Elective Courses and Non-Major Elective Course.

➢ Pass minimum for Practice for SET/NET - General Paper is 50 Marks.

- Attendance

➢ The students who have attended the classes for 76 days (85%) and above are permitted to appear for the Summative Examinations without any condition.

➢ The students who have only 60-75days (66% -84%) of attendance are permitted to appear for the Summative Examinations after paying the required fine amountand fulfilling other conditions according to the respective cases.

➢ 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.

➢ 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.

➢ These rules are applicable to UG, PG and M.Phil. Programmes and come into effect from 2020-2021 onwards.

➢ For Certificate, Diploma, Advanced Diploma and Post Graduate Diploma Programmes, the students require 75% of attendance to appear for the Theory/Practical Examinations.

B.2 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 implementedusing 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	PO8
Average Direct PO Attainment									
Direct PO Attainment in percentage									

Indirect Attainment of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Graduate Exit Survey								
Indirect PO Attainment								

Attainments of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
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 $\geq$70%	Excellent
60% $\leq$ Attainment Value < 70%	Very Good
50% $\leq$ Attainment Value < 60%	Good
40% $\leq$ 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 3 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 M.C.A. Programme.

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Reaccredited with 'A++' Grade (4th Cycle) by NAAC
VIRUDHUNAGAR
Quality Education with Wisdom and Values

MASTER OF COMPUTER APPLICATIONS (8019)

Outcome Based Education with Choice Base Credit System
Programme Structure - Allotment of Hours and Credits
For those who join in the Academic Year 2024-2025

Components	Semester				Total Number of Hours (Credits)
	I	**II**	**III**	**IV**	
Core Course	6 (5)	6 (5)	6 (6)	6 (5)	24 (21)
Core Course	6 (5)	6 (5)	6 (5)	-	18 (15)
Core Course	6 (4)	-	6 (5)	-	12 (9)
Core Course Practical	-	6 (4)	6 (4)	6 (4)	18 (12)
Project	-	-	-	6 (5)	6(5)
Elective Course (DSEC)	6 (3)	4 (3)	3 (2)	-	13 (8)
Elective Course (Generic)	6 (3)	4 (3)	-	-	10 (6)
Elective Course(NME)	-	4 (2)	3 (2)	-	7 (4)
Elective Course- (Industry / Entrepreneurship) 20% Theory 80 % Practical	-	-		6 (4)	6 (4)
Skill Enhancement Course/ Professional Competency Skill	-	-	-	6 (3)	6 (3)
Self Study Course	-	-	0 (1)	-	0 (1)
Internship/Industrial Activity	-	-	0 (2)	-	0 (2)
Extension Activity	-	-	-	0 (1)	0 (1)
Total	**30 (20)**	**30 (22)**	**30 (27)**	**30 (22)**	**120 (91)**
Extra Credit Course(Optional) - Offered by the Department	-	-	0(2)	-	0(2)
Extra Credit Course(Optional) - MOOC	-	-	-	-	Limited to a maximum of 15 credits

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

MASTER OF COMPUTER APPLICATIONS (M.C.A.)
Programme Code – 8019
PROGRAMME CONTENT
2024 - 2025

SEMESTER I

S.No.	Components	Title of the Course	Course Code	Hours per Week	Credits	Exam. Hours	Marks		
							Int.	Ext.	Total
1	Core Course-1	Discrete Mathematics	24PCAC11	6	5	3	25	75	100
2	Core Course-2	Linux and Shell Programming	24PCAC12	6	5	3	25	75	100
3	Core Course-3	Python Programming	24PCAC13	6	4	3	25	75	100
4	Elective Course-1 (DSEC)	Data Engineering and Management Practical	24PCAE11P	6	3	3	40	60	100
5	Elective Course -2 (Generic)	Soft Computing Practical	24PCAE12P	6	3	3	40	60	100
Total				**30**	**20**				**500**

DSEC – Discipline Specific Elective Course

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

MASTER OF COMPUTER APPLICATIONS

SEMESTER II

S.No.	Components	Title of the Course	Course Code	Hours per Week	Credits	Exam. Hours	Marks		
							Int.	Ext.	Total
1	Core Course-4	Data Structures and Algorithms	24PCAC21	6	5	3	25	75	100
2	Core Course-5	Big Data Analytics	24PCAC22	6	5	3	25	75	100
3	Core Course- 6 Practical-1	Data Structures and Algorithms Practical	24PCAC21P	6	4	3	40	60	100
4	Elective Course-3 (DSEC)	Computer Vision Practical	24PCAE21P	4	3	3	40	60	100
5	Elective Course -4 (Generic)	Cyber Security	24PCAE22	4	3	3	25	75	100
6	Elective Course -5 (NME)	Fundamentals of Web Design	24PCAN21	4	2	3	25	75	100
Total				**30**	**22**				**600**

DSEC – Discipline Specific Elective Course
NME – Non Major Elective Course

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

MASTER OF COMPUTER APPLICATIONS

SEMESTER III

S.No.	Components	Title of the Course	Course Code	Hours per Week	Credits	Exam. Hours	Marks		
							Int.	Ext.	Total
1	Core Course-7	Advanced Java Programming	24PCAC31	6	6	3	25	75	100
2	Core Course-8	Web Technology	24PCAC32	6	5	3	25	75	100
3	Core Course-9	Advanced Machine Learning	24PCAC33	6	5	3	25	75	100
4	Core Course -10 Practical-2	Advanced Java Programming Practical	24PCAC31P	6	4	3	40	60	100
5	Elective Course-6 (DSEC)	Web Technology Practical	24PCAE31P	3	2	3	40	60	100
6	Elective Course -7 (NME)	Database Fundamentals	24PCAN31	3	2	3	25	75	100
7	Self Study Course	Practice for SET/NET – General Paper	24PGOL31	-	1	2	100	-	100
8	Internship/Industrial Activity	Internship	24PCAI31	-	2	-	100	-	100
Total				**30**	**27**				**800**

S.No.	Components	Title of the Course	Course Code	Hours per Week	Credits	Exam. Hours	Marks		
							Int.	Ext.	Total
1	Extra Credit Course	E-Commerce	24PCAO31	-	2	3	100	-	100

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

MASTER OF COMPUTER APPLICATIONS

SEMESTER IV

S.No.	Components	Title of the Course	Course Code	Hours per Week	Credits	Exam. Hours	Marks		
							Int.	Ext.	Total
1	Core Course-11	Cryptography and Network Security	24PCAC41	6	5	3	25	75	100
2	Core Course -12 Practical-3	Industry Dynamics Technology-Data Visualisation Practical	24PCAC41P	6	4	3	40	60	100
3	Project	Project with Viva Voce	24PCAC41PR	6	5	-	40	60	100
4	Elective Course-8 (Industry)	Social Networks Practical	24PCAE41P	6	4	3	40	60	100
5	SEC/Professional Competency Skill	Practice for SET/NET – Paper II Computer Science	24PCAS41	6	3	3	25	75	100
6	Extension Activity	Extension Activity		-	1	-	100	-	100
Total				**30**	**22**				**600**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester I		Hours/Week: 6	
Core Course-1	**DISCRETE MATHEMATICS**	Credits: 5	
Course Code **24PCAC11**		Internal 25	External 75

Course Outcomes

On completion of the course the students will be able to

CO1: understand the basic concepts of relations, functions, Mathematical logic, Matrices and Graphs. [K2]

CO2: apply the knowledge gained in functions to other fields.[K3]

CO3: solve problems in matrices, mathematical logic and graphs. [K3]

CO4: analyze the concepts of relations & functions in set theory. [K4]

CO5: analyze the concepts of mathematical logic, matrices and graphs in interdisciplinary level. [K4]

UNIT I

Relations- Binary relations-Operations on relations- properties of binary relations in a set – Equivalence relations— Representation of a relation by a matrix - Representation of a relation by a digraph.

Functions-Definition and examples-Classification of functions-Composition of functions-Inverse function. (18 Hours)

UNIT II

Mathematical Logic-Logical connectives-**Well formed formulas** – Truth table of well formed formula –Algebra of proposition –Quine's method- **Normal forms of well formed formulas**- Disjunctive normal form Principal Disjunctive normal form-Conjunctive normal form-Principal conjunctive normal form-**Rules of Inference for propositional calculus –Quantifiers**- Universal Quantifiers-Existential Quantifiers (18 Hours)

UNIT III

Recurrence Relations- Formulation -solving recurrence Relation by Iteration-solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two- Solving Linear Non homogeneous Recurrence Relations. **Permutations**-Cyclic permutation- Permutations with repetitions- permutations of sets with indistinguishable objects.   (18 Hours)

UNIT IV

Matrices- special types of matrices-Determinants-Inverse of a square matrix-Cramer's rule for solving linear equations-Elementary operations Rank of a matrix-solving a system of linear equations-characteristic roots and characteristic vectors-Cayley-Hamilton Theorem-problems   (18 Hours)

UNIT V

Graphs -Connected Graphs -Euler Graphs- Eulerian-Hamiltonian circuits and paths –planar graphs – Complete graph-Bipartite graph- Matrix representation of graphs   (18 Hours)

TEXT BOOK

1.Chandrasekaran. N and Umaparvathi. M, *Discrete Mathematics (Third Edition)*, PHI Learning Pvt. Ltd., 4 Apr 2022.

2.M.Venkataraman, N.Sridharan and N.Chandrasekaran, *Discrete Mathematics*, The National Publishing Company, 2009

Unit	Text Book	Chapter	Section
I	1	5	5.1 to 5.5, 5.8, 5.9
II	1	1	1.1, 1.1.1, 1.1.2
		2	2.1 to 2.5, 2.5.1, 2.7, 2.8, 2.11
III	1	6	6.1 to 6.5
		3	3.1 to 3.3, 3.5
IV	2	VI	1 to 7
V	1	10	10.1 to 10.6

REFERENCE BOOKS

1. Seymour Lipschutz and Maarc Lipson, *Discrete Mathematics (Second Edition)*, Tata McGraw Hill.

2. S.Arumugam and A. Thangapandi Isaac, *Modern Algebra*, Scitech publications
   2005.

3   S.Arumugam and S.Ramachandran, *Invitation to Graph Theory*, Scitech
   Publications,2005, Chennai.

Web Resources
Web resources from NDL Library, E-content from open-source libraries

Course Code 24PCSA11	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	3	1	2
CO2	3	3	3	3	3	1	2
CO3	3	3	3	3	3	1	2
CO4	3	2	3	3	3	3	2
CO5	3	2	3	2	3	3	2

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

Dr.M.C. Maheswari   Mrs.K.Anitha
Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester I		Hours/Week: 6	
Core Course-2	**LINUX AND SHELL PROGRAMMING**	Credits: 5	
Course Code **24PCAC12**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : understand the concepts and methodology of Linux shell programming. [K2]

CO2 : apply fundamentals of control structure and script controls. [K3]

CO3 : Illustrate the functions, graphical desktop interface and editors. [K3]

CO4 : examine the concepts and methodology of regular expression. [K4]

CO5 : analyze the advanced features of sed and gawk editors. [K4]

UNIT I

Basic bash Shell Commands: Interacting with the shell - Traversing the file system - Listing files and directories - Managing files and directories - Viewing file contents - **Basic Script Building**: Using multiple commands - Creating a script file - Displaying messages - Using variables - Redirecting input and output - Pipes - Performing math - Exiting the script - **Using Structured Commands**: Working with the if-then statement - Nesting ifs- Understanding the test command - Testing compound conditions - Using double brackets and parentheses - Looking at case.

(18 Hours)

UNIT II

More Structured Commands: Looping with for statement - Iterating with the until statement - Using the while statement - Combining loops - Redirecting loop output. **Handling User Input**: Passing parameters - Tracking parameters - Being shifty - Working with options -Standardizing options - Getting user input. **Script Control**: Handling signals -

Running scripts in the background - Forbidding hang-ups - Controlling a Job - Modifying script priority -Automating script execution. (18 Hours)

UNIT III

Creating Functions: Basic script functions - Returning a value - Using variables in functions - Array and variable functions - Function recursion - Creating a library - Using functions on the command line. **Writing Scripts for Graphical Desktops**: Creating text menus - Building text window widgets - Adding X Window graphics. (18 Hours)

UNIT IV

Introducing sed and gawk: Learning about the sed Editor - Getting introduced to the gawk Editor - Exploring sed Editor basics. **Regular Expressions**: Defining regular expressions - Looking at the basics - Extending our patterns - Creating expressions. (18 Hours)

UNIT V

Advanced sed: Using multiline commands - Understanding the hold space - Negating a command - Changing the flow - Replacing via a pattern - Using sed in scripts - Creating sed utilities. **Advanced gawk**: Reexamining gawk - Using variables in gawk - Using structured commands - Formatting the printing - Working with functions. (18 Hours)

TEXT BOOK:

1. Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting BIBLE", Wiley Publishing, 3rd Edition, 2015.

REFERENCE BOOKS:

1. Clif Flynt, Sarath Lakshman, Shantanu Tushar, "Linux Shell Scripting Cookbook ", Packt Publishing, 3rd Edition, 2017.
2. Stephen G.Kochan, Patrick Wood, "Shell Programming in Unix, Linux, and OS X", Addison Wesley Professional, 4th Edition, 2016
3. Robert Love, "Linux System Programming", O'Reilly Media, Inc, 2013
4. W.R. Stevens, "Advanced Programming in the UNIX environment", 2nd Edition, Pearson Education, 2013

5. Graham Glass, King Ables, "UNIX for Programmers and Users", 3rd Edition, Pearson Education, 2003.

Course Code 24PCAC12	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	2	-	-	-	-	-	1	-	-
CO2	3	-	-	-	3	2	-	2	1	1
CO3	2	2	2	3	3	2	1	-	1	1
CO4	2	3	2	2	-	3	2	2	1	1
CO5	2	3	3	2	1	3	3	3	1	1

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

Dr. N. Santhi
Head of the Department

Dr. N. Santhi
Course Designer

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester I		Hours/Week: 6	
Core Course-3	**PYTHON PROGRAMMING**	Credits: 4	
Course Code **24PCAC13**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : comprehend the programming skills in python and develop applications using conditional branches and loop. [K2]

CO2 : design python applications with strings and functions. [K3]

CO3 : understand and implement the Object Oriented Programming paradigm with the concept of objects and classes, Inheritance and polymorphism. [K3]

CO4 : evaluate the use of Python packages to perform numerical computations. [K4]

CO5 : analyze the importance of data visualization. [K4]

UNIT I

Introduction: Fundamental ideas of Computer Science - Strings, Assignment, and Comments - Numeric Data types and Character sets - Expressions - **Loops and Selection Statements**: Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop.

(18 Hours)

UNIT II

Strings and Text Files: Accessing Characters and substrings in strings - Data encryption- Strings and Number systems - String methods – Text - Lists and Dictionaries: Lists - Dictionaries - **Design with Functions**: A Quick review - Problem Solving with top - Down Design - Design with recursive Functions - Managing a Program's namespace - Higher-Order Functions.

(18 Hours)

UNIT III

Design with Classes: Getting inside Objects and Classes - Data-Modeling Examples - Building a New Data Structure - The Two-Dimensional Grid - Structuring Classes with Inheritance and Polymorphism - Graphical User Interfaces - The Behavior of terminal - Based programs and GUI - Based programs - Coding Simple GUI - Based programs - Windows and Window Components - Command Buttons and responding to events.

(18 Hours)

UNIT IV

Data Handling using Numpy - Data and its purpose - Data Science and its applications - The numpy module - Creating numpy arrays - Array attributes - Converting 2D numpy array into 1D array - **Array slicing**: Accessing subarrays - Reshaping of Arrays - Array concatenation and splitting - How numpy broadcasting works - Performing mathematical operations on numpy arrays - Transposing arrays - Inserting and deleting array elements - Find the index of a value - Sorting a numpy array - Normalize array - Array subsets.

(18 Hours)

UNIT V

Python Pandas - Data frame - Pandas data frame functions and attributes - Pivoting data frame - Sorting - Missing data - Combining data frame - Descriptive statistics - Summarizing or describing data - Function application - Aggregation - Transform function in Python - Reindexing in Pandas data frame - Altering column labels - Data wrangling - Time series data structures. Plotting Graphs - Importance of data visualization - Bar Chart - Plotting Histograms - Frequency Polygon - Box plot - Scatter plot. (18 Hours)

TEXT BOOKS:

1. K.A. Lambert, " Fundamentals of Python: first programs", Second Edition, Cengage Learning, 2018 **(Unit - I, II and III)**

2. Dr. Reema Thareja, "Data Science and Machine Learning using Python", McGraw Hill Education (India) Private Limited, 2023 **(Unit IV & V)**

REFERENCE BOOKS:

1. Michael Knapp, Python: Programming For Beginners: Learn The Fundamentals of Python in 7 Days, Kindle Edition, 2017.

2. Richard Ozer, Beginner Python Programming: The Insider Guide to Basic Python Programming Fundamentals, 2017.

Course Code 24PCAC13	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	3	2	-	1	-	-	-	-
CO2	2	3	2	2	2	1	-	2	-	1
CO3	-	2	3	-	2	1	-	-	-	-
CO4	2	-	-	2	3	2	2	2	-	-
CO5	3	2	3	3	3	3	-	3	-	-

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

Dr. N. Santhi   Dr. B. Subashini
Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Viru**d**hunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester I		Hours/Week: 6	
Elective Course -1 (DSEC)	**DATA ENGINEERING AND MANAGEMENT PRACTICAL**	Credits: 3	
Course Code **24PCAE11P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : understand the scripting knowledge in MongoDB and perform basic operations in shell prompt. [K2]

CO2 : write MongoDB scripts to do data manipulations and query operations and visualize using DbVisualizer. [K2]

CO3 : key in the programs, execute the programs with required input and get expected outputs with neat formatting and prepare the record work. [K3]

CO4 : illustrate the given program written using MongoDB features and answer questions related with that program. [K3]

CO5 : analyze the applications created using MongoDB. [K4]

List of Programs:

1. Write a script to create a MongoDB database and perform insert operation.
2. Write a MongoDB script to perform query operations.
3. Write a MongoDB script to delete single document.
4. Write a MongoDB script to delete multiple documents.
5. Write a MongoDB Script to perform update operations on single document.
6. Write a MongoDB Script to perform update operations on multiple documents.
7. Write a MongoDB Script to update documents with aggregation pipeline.
8. Write a MongoDB script to perform string aggregation operations.
9. Design a Data Model for MongoDB using DbVisualizer.
10. Perform CRUD operations using DbVisualizer.

Course Code 24PCAE11P	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	3	2	-	-	-	2	-	-
CO2	3	2	3	3	-	-	-	-	1	-
CO3	2	2	-	2	3	2	-	2	-	1
CO4	2	-	2	2	2	1	1	2	-	-
CO5	2	-	1	3	3	2	2	-	-	-

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

Dr. N. Santhi   Mrs. J. Porkodi
Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester I		Hours/Week: 6	
Elective Course -2 (Generic)	**SOFT COMPUTING PRACTICAL**	Credits: 3	
Course Code **24PCAE12P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : comprehend the programming skills in python and write codings using object oriented concepts, basic laws and algorithms. [K2]

CO2 : write python applications with elementary data items, lists, dictionaries, tuples, functions and data manipulation. [K2]

CO3 : key in the programs, execute the programs with required input and get expected outputs with neat formatting and prepare the record work. [K3]

CO4 : illustrate the given program written using Python features and answer questions related to that program. [K3]

CO5 : analyze the applications created in Python. [K4]

List of programs in Python:

1. Implement programs on basic control structures and loops

2. Implement programs on elementary data items, lists, tuples and dictionaries

3. Implement programs on manipulation of matrices

4. Implement programs on functions

5. Implement programs on object oriented programming concepts

6. Implement programs on data frame manipulation

7. Implement programs on data preprocessing (Missing values, categorical values, inconsistencies, scaling and normalization)

8. Implement programs on summarizing, aggregating and grouping data

9.   Implement the searching and sorting operations

10.   Perform a Regular Expression to validate the data from the user

11.   Implement programs using data frame

12.   Implementation of Logic gates

13.   Implementation of De-Morgan's Law

14.   Perform Union, Intersection and complement operations of a fuzzy set

15.   Implementation of fuzzy based Logical operations

16.   Implementation of fuzzy based arithmetic operations

Course Code 24PCAE12P	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	3	2	-	-	-	3	-	-
CO2	3	2	3	-	-	-	-	-	1	-
CO3	3	2	-	3	3	2	-	2	-	1
CO4	2	-	2	2	2	1	2	1	-	-
CO5	2	-	1	3	3	2	2	-	-	-

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

Dr. N. Santhi   Dr. B. Subashini

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester II		Hours/Week: 6	
Core Course-4	**DATA STRUCTURES AND ALGORITHMS**	Credits: 5	
Course Code		Internal	External
24PCAC21		25	75

COURSE OUTCOMES

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

CO1 : understand the concepts of various ADT structures. [K2]

CO2 : apply right data structures based on the real time problem domain. [K3]

CO3 : illustrate how and where to implement modern data structures with Python language. [K3]

CO4 : examine different ADT structures with real-time scenarios.[K4]

CO5 : analyze the various data structures with their different implementations. [K4]

UNIT I

Abstract Data Types: Introduction - Date Abstract Data Type – Bags - Iterators - **Arrays**: Array Structure - Python List - Two Dimensional Arrays - Matrix Abstract Data Type - **Sets and Maps:** Sets - Maps - Multi-Dimensional Arrays.

(18 Hours)

UNIT II

Algorithm Analysis: Experimental Studies-Seven Functions - Asymptotic Analysis - **Recursion**: Illustrative Examples - Analyzing Recursive Algorithms - Linear Recursion - Binary Recursion - Multiple Recursion.

(18 Hours)

UNIT III

Stacks, Queues, and Deques: Stacks - Queues - Double-Ended Queues Linked - **Lists:** Singly Linked Lists - Circularly Linked Lists - Doubly Linked Lists - **Trees:** General Trees-Binary Trees - Implementing Trees - Tree Traversal Algorithms. (18 Hours)

UNIT IV

Priority Queues: Priority Queue Abstract Data Type - Implementing a Priority Queue – Heaps -Sorting with a Priority Queue - **Maps, Hash Tables, and Skip Lists:** Maps and Dictionaries -Hash Tables - Sorted Maps - Skip Lists - Sets, Multisets, and Multimaps.

(18 Hours)

UNIT V

Search Trees: Binary Search Trees - Balanced Search Trees - AVL Trees - **Sorting and Selection:** Merge sort - Quick sort - Comparing Sorting Algorithms - Selection - **Graph Algorithms:** Graphs - Data Structures for Graphs - Graph Traversals - Shortest Paths-Minimum Spanning Trees. (18 Hours)

TEXT BOOKS:

1. Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011. (Unit - 1) Chapters: 1, 2, 3.

2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", John Wiley & Sons, 2013. (Unit - 2, 3, 4, and 5) Chapters: 3 to 12, and 14.

REFERENCE BOOKS:

1. Dr. Basant Agarwal; Benjamin Baka, "Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7", Packt Publishing, 2018.

2. Magnus Lie Hetland, "Python Algorithms: Mastering Basic Algorithms in the Python Language", Apress, 2014.

Course Code 24PCAC21	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	2	2	3	3	3	-	-	1	-	-
CO2	3	3	3	3	3	2	2	2	1	1
CO3	2	2	3	3	3	2	2	-	1	1
CO4	2	2	3	3	2	3	3	2	1	1
CO5	3	2	2	2	1	3	3	3	1	1

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

Dr. N. Santhi   Mrs. J. Porkodi

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4ᵗʰ Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester II		Hours/Week: 6	
Core Course-5	**BIG DATA ANALYTICS**	Credits: 5	
Course Code **24PCAC22**		Internal 25	External 75

COURSE OUTCOMES

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

CO1	:	understand the concepts of Big Data, Hadoop Ecosystem, Data analytics and its role in social media and mobile applications. [K2]
CO2	:	illustrate an application using Map Reduce and HBase and attain the results of applications using Big Data Analytics. [K3]
CO3	:	make use of Hadoop, HDFS and MapReduce concepts. [K3]
CO4	:	examine the importance of Hadoop framework elements, Social Media Analytics and Mobile Analytical tools and compare Analysis and Reporting of Big Data. [K4]
CO5	:	analyze the various Hadoop Ecosystem components, Big Data tools such as Hive, Hbase and Pig. [K4]

UNIT I

Big Data and Analytics: Classification of Digital Data: Structured Data- Semi Structured Data and Unstructured Data - **Introduction to Big Data:** Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop - **Environment Big Data Analytics:** Classification of Analytics - Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments - Basically Available Soft State Eventual Consistency - Top Analytics Tools.   (18 Hours)

UNIT II

Technology Landscape: NoSQL, Comparison of SQL and NoSQL, Hadoop - RDBMS Versus Hadoop - Distributed Computing Challenges - Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem.   (18 Hours)

UNIT III

Mongodb and Mapreduce Programming: MongoDB: Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language - **MapReduce**: Mapper – Reducer - Combiner - Partitioner - Searching - Sorting - Compression.   (18 Hours)

UNIT IV

Hive: Introduction - Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing - Views - Sub- Query - Joins - Aggregations - Group by and Having - RCFile - Implementation - Hive User Defined Function - Serialization and Deserialization.   (18 Hours)

UNIT V

Pig: Introduction – Anatomy – Features - Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution - Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive.   (18 Hours)

TEXT BOOK

1. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publications, First Edition,2015

REFERENCE BOOKS

1. Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman, "Big data for dummies", John Wiley & Sons, Inc. (2013)
2. Tom White, "Hadoop The Definitive Guide", O'Reilly Publications, Fourth Edition, 2015

3. Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss, "Hadoop For Dummies", Wiley Publications, 2014

4. Robert D.Schneider, "Hadoop For Dummies", John Wiley & Sons, Inc. (2012)

5. Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012 Chuck Lam, "Hadoop In Action", Dreamtech Publications, 2010.

Course Code 24PCAC22	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	1	1	-	-	-	1	1	2
CO2	3	3	-	-	2	2	2	1	-	-
CO3	3	3	2	2	3	-	3	1	2	2
CO4	3	3	-	-	3	2	3	1	-	-
CO5	3	3	1	1	3	-	3	1	2	2

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

Dr. N. Santhi   Mrs. B. Sakthi
Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR
Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester II		Hours/Week: 6	
Core Course -6 Practical-1	**DATA STRUCTURES AND ALGORITHMS PRACTICAL**	Credits: 4	
Course Code **24PCAC21P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1   :   identify the ADT structures required for the given real time problem. [K2]

CO2   :   write programs for modern data structures with Python language. [K2]

CO3   :   key-in the programs and test the programs with required input and get expected outputs with neat formatting and prepare the record work. [K3]

CO4   :   explain the programs implemented and deduce the answers for any queries raised. [K3]

CO5   :   analyse the applications created using various data structures. [K4]

List of Programs:

1. Recursion concepts.

   Linear recursion

   Binary recursion.

2. Stack ADT.

3. Queue ADT.

4. Doubly Linked List ADT.

5. Heaps using Priority Queues.

6. Merge sort.

7. Quick sort.

8. Binary Tree Traversals.

9. Binary Search Tree.

10. Graph Traversals.

Course Code 24PCAC21P	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	2	3	-	2	-	1	1	-	-	-
CO2	3	2	2	-	3	1	2	2	1	1
CO3	2	2	2	2	3	2	2	2	1	1
CO4	2	2	2	-	2	2	3	2	1	1
CO5	1	1	2	**2**	2	3	3	3	1	1

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

Dr. N. Santhi   Mrs. J. Porkodi

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4ᵗʰ Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester II		Hours/Week: 4	
Elective Course -3 (DSEC)	**COMPUTER VISION PRACTICAL**	Credits: 3	
Course Code **24PCAE21P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : outline the basic concepts of image handling and processing needed for the given problem. [K2]

CO2 : write programs using various computer vision fundamental algorithms. [K2]

CO3 : key-in the programs and test the programs with required input and get expected outputs with neat formatting and prepare the record work. [K3]

CO4 : explain the programs implemented using various algorithms for image processing and computer vision and deduce the answers for any queries raised. [K3]

CO5 : analyse the applications created using Python with OpenCV. [K4]

List of Programs using Python with OpenCV:

1. Image Loading, Exploring, and displaying an Image.

2. Access and Manipulate of Image Pixels.

3. Image Transformations.

    i. Resizing

    ii. Rotation

4. Addition operation of Two Images.

5. Image filtering operations.

    i. Mean Filtering

    ii. Gaussian Filtering

    iii.

6. Image Binarization using Simple Thresholding method.

7. Edge Detection operation using Sobel and Scharr Gradients.

8. Find Grayscale and RGB Histograms of an Image.

9. Segment an Image using K-means Clustering algorithm.

10. Write a program to classify an Image using KNN Classification algorithm.

Course Code 24PCAE21P	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	2	1	-	3	-	-
CO2	3	2	-	-	2	2	1	2	1	1
CO3	3	2	1	1	3	1	2	2	-	-
CO4	3	2	2	2	-	2	2	-	-	-
CO5	3	2	3	3	-	3	2	1	-	-

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

Dr. N. Santhi   Mrs. R. Nagajyothi
Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Reaccredited with 'A++' Grade (4th Cycle) by NAAC
VIRUDHUNAGAR
Quality Education with Wisdom and Values

M.C.A.
(for those who join in 2024-2025)

Semester II		Hours/Week: 4	
Elective Course -4 (Generic)	**CYBER SECURITY**	Credits: 3	
Course Code **24PCAE22**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : understand the basics of Cybercrime and Computer forensics with protecting mechanism. [K2]

CO2 : explore the working principles of WLAN, Email and Smartphone along with security mechanism and guidelines . [K3]

CO3 : illustrate the importance of cyber investigations with its functioning role and learn the basics of Wi Fi and its security measures. [K3]

CO4 : examine the method of seize the digital evidence. [K4]

CO5 : analyse the concepts of digital forensics with cybercrime prevention techniques. [K4]

UNIT I

Introduction to cybercrime: Classification of cybercrimes - Reasons for commission of cybercrime - Malware and its type - Kinds of cybercrime - Authentication - Encryption - Digital signatures - Antivirus - Firewall - Steganography - Computer forensics - Why should we report cybercrime - Introduction - Counter cyber security initiatives in India - Generating secure password - Using password manager - Enabling two-step verification - Securing computer using free antivirus.   (12 Hours)

UNIT II

Tips for buying online: Clearing cache for browsers - Wireless LAN - Major issues with WLAN - Safe browsing guidelines for social networking sites - email security tips -

Introduction - Smartphone security guidelines - Purses, wallets, smart phones - Platforms, setup and installation - Communicating securely with a smartphone.   (12 Hours)

UNIT III

Cyber investigation roles: Introduction - Role as a cybercrime investigator - The role of law enforcement officers - The role of the prosecuting attorney - Legal issues of intercepting Wi-Fi transmission - Wi-Fi technology - Wi-Fi RF - Scanning RF - eavesdropping on Wi-Fi - Fourth amendment expectation of privacy in WLAN.   (12 Hours)

UNIT IV

Seizure of digital information: Introduction - Defining digital evidence - Digital evidence seizure methodology - Factors limiting the wholesale seizure of hardware - Other options for seizing digital evidence - Common threads within digital evidence seizure - Determining the most appropriate seizure method - Conducting cyber investigations - Demystifying computer / cyber crime - IP addresses - The explosion of networking - Interpersonal communication.

(12 Hours)

UNIT V

Digital forensics and analyzing data: Introduction - The evolution of computer forensics - Phases of digital forensics – Collection - Examination – Analysis – Reporting - Cyber crime prevention: Introduction - Crime targeted at a government agency.   (12 Hours)

TEXT BOOKS:

1. Dr.Jeetendra Pande, **"**Introduction to Cyber Security" Published by Uttarakhand Open University, 2017.
2. Anthony Reyes, Kevin O'Shea, Jim Steele, Jon R. Hansen, Captain Benjamin R. Jean Thomas Ralph, "Cyber-crime investigations" - Bridging the gaps between security professionals, law enforcement and prosecutors, 2007.

REFERENCE BOOKS

1. Sebastian Klipper, "Cyber Security" Ein Einblick fur Wirtschaftswissenschaftler Fachmedien Wiesbaden,2015
2. John G.Voller Black and Veatch, "Cyber Security" Published by John Wiley & Sons, Inc., Hoboken, New Jersey Published simultaneously in Canada ©2014.

Course Code 24PCAE22	PO1		PO2		PO3	PO4	PO5	PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	2	-	-	-	-	-	1	-	-
CO2	3	-	-	-	3	2	-	2	1	1
CO3	2	2	2	3	3	2	1	-	1	1
CO4	2	3	2	2	-	3	2	2	1	1
CO5	2	3	3	2	1	3	3	3	1	1

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

Dr. N. Santhi   Dr. B. Subashini
Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.C.A.

(for those who join in 2024-2025)

Semester II		Hours/Week: 4	
Elective Course -5 (NME)	**FUNDAMENTALS OF WEB DESIGN**	Credits: 2	
Course Code **24PCAN21**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : gain knowledge on the basis of web, web pages, HTML tags, CSS and Java Script. [K1]

CO2 : understand the concepts of web page creation using HTML, CSS and Java Script. [K2]

CO3 : acquire knowledge of creating web pages. [K2]

CO4 : make use of HTML, CSS and Java Script to design web pages. [K3]

CO5 : analyse how the web works and the steps of creating a website using HTML, CSS and Java Script, examine G-Suite blog creation. [K4]

UNIT I

Internet Basics: Basic concepts – Communicating on the Internet – Internet domains – Internet server identities – Establishing connectivity on the Internet – Client IP address – Transmission control protocol.   (12 Hours)

UNIT II

Introduction to HTML: HTML Tags – The structure of HTML program – Text formatting – Text styles – Other text effects.   (12 Hours)

UNIT III

Lists: Types of lists - Adding graphics to HTML documents – Tables – Linking documents – Links – Images as hyperlinks – Frames. (12 Hours)

UNIT IV

Introduction to JavaScript: JavaScript in web pages – Basic programming techniques – Functions in JavaScript – Dialogue boxes. (12 Hours)

UNIT V

Forms used by a website – Form object – Dynamic HTML: Cascading style sheets –Class.

(12 Hours)

TEXT BOOK

1. Web enabled commercial Application Development using HTML, JavaScript, DHTML and PHP by Ivan Bayross Fourth Revised Edition BPB Publications, Reprinted 2013.

REFERENCE BOOKS

1. Jennifer Niederst Robbins, Mathews Leon – Learning Web Design – A Beginners guide to HTML, CSS, JAVA SCRIPT and Web Graphics, 5th Edition.
2. Core Web programming Marty Hall, Larry Brown-The SUN Microsystem Press, Second edition, 2001
3. Web Technology: A Developer's Perspective, N.P. Gopalan, J. Akilandeswari, PHI, 2007.

Course Code 24PCAN21	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	-	-	-	2	-	-
CO2	3	3	-	-	-	2	-	1
CO3	3	2	-	-	-	2	-	-
CO4	2	2	1	1	-	1	-	-
CO5	2	2	1	1	1	1	2	1

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

Dr. N. Santhi   Dr. K.S. Jeyalakshmi

Head of the Department   **Course Designer**