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 2025 - 2026)

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

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, ComputerApplications 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, Biochemistry, Home Science - Nutrition and Dietetics, Biotechnology, Computer 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 Courses (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	Semester	Course Code	Department
Introduction to Epigraphy	II	24PHIN21	History
Communication Strategies for Leadership Success	III	24PHIN31	
Functional English	II	24PENN21	English
English for Careers	III	24PENN31	
ஆளுமை மேம்பாடு	II	24PTAN21N	Tamil
தகவல் தொடர்பியல்	III	24PTAN31	
Accounting for Managers -1	II	24PCON21N	Commerce
Accounting for Managers -II	III	24PCON31	
Entrepreneurship Development	II	24PBAN21	Business Administration
Employability Skills	III	24PBAN31	
Mathematics for Life Sciences	II	24PMTN21	Mathematics
Statistics for Life and Social Sciences	III	24PMTN31	
Solid Waste Management	II	24PPHN21	Physics
Sewage and Waste Water Treatment and Reuse	III	24PPHN31	
Chemistry in Everyday Life	II	24PCHN21	Chemistry
Industrial Chemistry	III	24PCHN31	
Food Preservation	II	24PHSN21	Home Science - Nutrition and Dietetics
Nutrition and Health	III	24PHSN31	

Nutritional Biochemistry	II	24PBCN21	Biochemistry
Molecular Basis of Diseases and Therapeutic Strategies	III	24PBCN31	
Tissue engineering	II	24PBON21	Biotechnology
Gene manipulation Technology	III	24PBON31	
Web Programming	II	24PCSN21	Computer Science
Python Programming	III	24PCSN31	
Fundamentals of Web Design	II	24PCAN21N	Computer Applications
Fundamentals of Cyber Security	III	24PCAN31	

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.

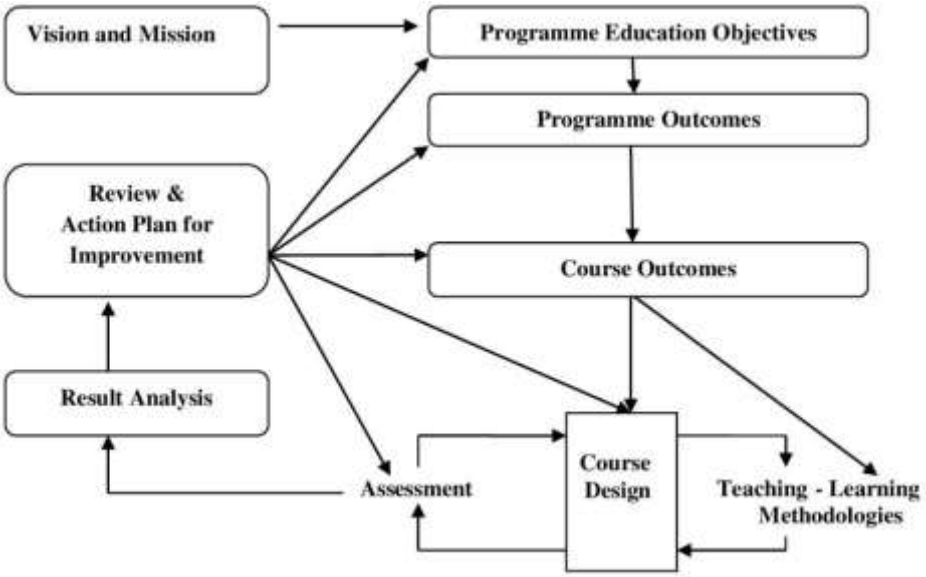
PO-PEO Mapping Matrix

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	✓	✓	-

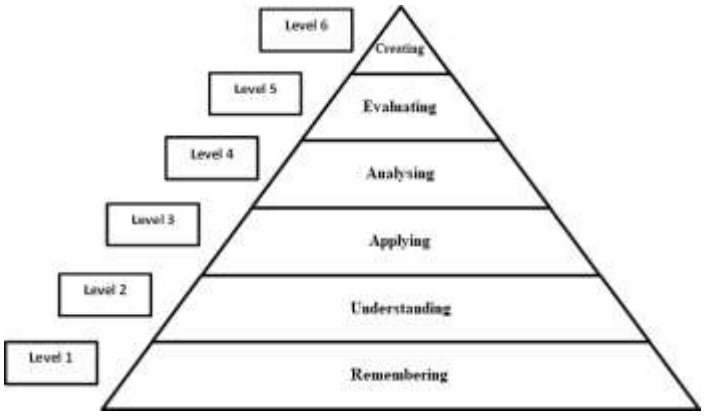
B.1.4 Course Outcomes (COs)

Course Outcomes are narrow statements restricted to the course contents given in five units. Course Outcomes describe what students would be capable of, after learningthe 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 oftwo 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
Practical Test	:	30
Record Performance	:	10
Total	:	40

Practical Test - Average of the two Practical Tests 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 Assessment	**:**	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 Assessment:

Project Report - 40 Marks
Viva Voce - 20 Marks

B.2.3. 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 Internship / Industrial Training

Internship / Industrial Training is mandatory for all the Students

- **Internship:** Students have to involve in a designated activity, working in an organization for maximum of 30 days (not less than 20 days) under the guidance of an identified mentor.
- **Industrial Training:** Students have to undertake in-plant training in industries individually or in group for maximum of 30 days (not less than 20 days)
- Internship / Industrial Training must be done during the second semester holidays

Distribution of Marks

Mode of Evaluation		Marks
Internal Assessment	:	75
External Assessment	:	25
Total	:	**100**

Internal Assessment

Mode of Evaluation		Marks
Onsite Learning/Survey	:	50
Report	:	25
Total		**75**

External Assessment

Mode of Evaluation		Marks
Viva-Voce	:	25
Total		**25**

B.2.5. 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.2.6. 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.2.7 Transfer of credits earned through MOOC (UGC recognized Courses)

- Students can opt for minimum of
  - 12 weeks Courses for Core Courses
  - 8 weeks Courses for Elective Courses
  - 4 weeks Courses for Skill Enhancement Course
- The Online Courses opted by the students will be verified and approved by the Head of the Department and forwarded to the Controller of Examinations through the Principal.
- Students are required to register for the equivalent Online Courses through the Institution's SWAYAM-NPTEL Local Chapter after submitting a Permission letter to the Head of the Department.
- The Course should be completed before the beginning of that particular Semester in which the selected Course is offered.

- The student should submit the Course Completion Certificate immediately after receiving it, to the Department.
- The Head of the Department has to send the list of the students and their Course Completion Certificates to the Controller of Examinations through the Principal.
- The students who have submitted the Completion Certificate are exempted from appearing the Periodic Tests and Summative Examinations of the respective course but without any exemption for class attendance.
- Credits allotted for the particular Course in the Curriculum will be transferred after the completion of the Online Course
- Students can earn up to 10 credits within the mandatory credits requirements of the Degree Programme by completing UGC recognised Online Courses.

B.2.8. EXTRA CREDIT COURSES (OPTIONAL)

2.8.1 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**

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

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 therespective 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 averagemark of theclass 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 ≥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 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.

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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)	-	-	-	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

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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	24PCAC21N	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-	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	24PCAN21N	4	2	3	25	75	100
Total				**30**	**22**				**600**

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

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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)	Fundamentals of Cyber Security	24PCAN31	3	2	3	25	75	100
7	Self Study Course	Practice for SET/NET – General Paper	24PGOL31	-	1	-	100	-	100
8	Internship/Industrial Activity	Internship	24PCAI31	-	2	-	75	25	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

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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	24PCAC42PR	6	5	-	40	60	100
4	Elective Course - 8 (Industry)	Social Networks Practical	24PCAE41P	6	4	3	40	60	100
5	Skill Enhancement Course/ 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**

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Semester II	**DATA STRUCTURES AND ALGORITHMS**	Hours/Week: 6	
Core Course-4		Credits: 5	
Course Code **24PCAC21N**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : understand the fundamental concepts of Abstract Data Types (ADT), including Arrays, Stacks, Queues, Trees, and Graphs. [K2]

CO2 : demonstrate the implementation of Arrays, Stacks, Queues, Trees, Hash Tables, and Sorting Algorithms in problem-solving. [K3]

CO3 : illustrate the practical implementation of ADT data structures using Python, showcasing real-world applications. [K3]

CO4 : evaluate the performance and efficiency of different ADTs by comparing their use in real-time scenarios.[K4]

CO5 : analyze algorithm efficiency using Big-O notation and recursion techniques to measure computational complexity. [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. **Algorithm Analysis**: Experimental Studies - Seven Functions - **Asymptotic Analysis**: The Bio-Oh Notation – Comparative Analysis. **Recursion**: **Illustrative Examples**: The Factorial Function – Binary Search - Analyzing Recursive Algorithms.

(20 Hours)

UNIT II

Stacks, Queues, and Deques: **Stacks**: The Stack Abstract Data Type - Simple Array-Based Stack Implementation - Reversing Data Using a Stack - Matching Parentheses and HTML Tags.

Queues: The Queue Abstract Data Type - Array-Based Queue Implementation. **Double-Ended Queues**: The Deque Abstract Data Type - Implementing a Deque with a Circular Array - Deques in the Python Collections Module. **Linked Lists**: **Singly Linked Lists:** Implementing a Stack with a Singly Linked List - Implementing a Queue with a Singly Linked List - **Circularly Linked Lists**: Round-Robin Schedulers - Implementing a Queue with a Circularly Linked List. **Doubly Linked Lists:** Basic Implementation of a Doubly Linked List - Implementing a Deque with a Doubly Linked List.

(18 Hours)

UNIT III

Trees: **General Trees**: Tree Definitions and Properties - The Tree Abstract Data Type - Computing Depth and Height - **Binary Trees**: The Binary Tree Abstract Data Type. **Implementing Trees**: Linked Structure for Binary Trees - Array-Based Representation of a Binary Tree - Linked Structure for General Trees - **Tree Traversal Algorithms**: Preorder and Postorder Traversals of General Trees - Breadth-First Tree Traversal - Inorder Traversal of a Binary Tree. **Priority Queues**: The Priority Queue Abstract Data Type - Priorities - The Priority Queue ADT - Implementing a Priority Queue - The Composition Design Pattern - Implementation with an Unsorted List - Implementation with a Sorted List – **Heaps**: The Heap Data Structure - Implementing a Priority Queue with a Heap - Array-Based Representation of a Complete Binary Tree - Python Heap Implementation - Analysis of a Heap-Based Priority Queue.

(18 Hours)

UNIT IV

Hash Tables: Hash Functions - Collision-Handling Schemes - **Search Trees:** Binary Search Trees - Navigating a Binary Search Tree - Searches - Insertions and Deletions - Python Implementation - Performance of a Binary Search Tree - Balanced Search Trees - Python Framework for Balancing Search Trees - AVL Trees - Update Operations – Performance of AVL Tree.

(18 Hours)

UNIT V

Sorting: Introduction - **Merge-Sort**: Divide-and-Conquer - Array-Based Implementation of Merge-Sort - The Running Time of Merge-Sort. **Quick-Sort**: High Level Description of Quick

Sort – Running Time of Quick Sort. **Graph Algorithms**: Graphs: The Graph ADT - Data Structures for Graphs - Edge List Structure - Adjacency List Structure - Adjacency Map Structure - Adjacency Matrix Structure - **Graph Traversals**: Depth-First Search – Classifying Graph Edges with DFS - Breadth-First Search.

(16 Hours)

TEXT BOOKS

1. Rance D. Necaise, (2011), "*Data Structures and Algorithms Using Python*", John Wiley & Sons. (Unit – 1)
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, (2013), "*Data Structures and Algorithms in Python*", John Wiley & Sons. (Unit – 2, 3, 4, and 5).

REFERENCE BOOKS

1. Dr. Basant Agarwal; Benjamin Baka, (2018), "*Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7*", Packt Publishing.
2. Magnus Lie Hetland, (2014), "*Python Algorithms: Mastering Basic Algorithms in the Python Language*", Apress.

Course Code 24PCAC21N	**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 — **Head of the Department**

J.Porkodi — **Course Designer**

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Semester II	**FUNDAMENTALS OF WEB DESIGN**	Hours/Week: 4	
Elective Course - 5 (NME)		Credits: 2	
Course Code **24PCAN21N**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : Gain knowledge based on the internet, web pages, HTML tags, CSS and JavaScript. [K1]

CO2 : Understand the concepts of web page creation using HTML, CSS and JavaScript. [K2]

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

CO4 : Make use of HTML, CSS and JavaScript to design web pages. [K3]

CO5 : analyse how the web works and the steps of creating a website using HTML, CSS and JavaScript.[K4]

UNIT I

A Web of Structured Documents - Introducing HTML and XHTML - Basic Text Formatting - Presentational Elements – Lists - Core Elements and Attributes - Links and Navigation - Basic Links - Understanding Directories and Directory Structures - Understanding URLs - Creating Links with the <a> Element.

(12 Hours**)**

UNIT II

Adding Images Using the <img> Element - Tables - Introducing Tables - Basic Table Elements and Attributes - Adding a <caption> to a Table - Grouping Sections of a Table.

(12 Hours**)**

UNIT III

Forms- Introducing Forms - Creating a Form with the Element - Form Controls - Creating Labels for Controls and the <label> Element - Frames - Introducing the Frameset When To Use Frames. The Element - The Element - The <noframes> Element -Creating Links between Frames.

(12 Hours)

UNIT IV

Cascading Style Sheets - Introducing CSS - Where You Can Add CSS Rules - CSS Properties - Controlling Text - Text Formatting.

(12 Hours)

UNIT V

Learning JavaScript - What Is Programming About? - How to Add a Script to Your Pages - The Document Object Model - Starting to Program with JavaScript – Variables – Operators - Functions - Conditional Statements – Looping - Events - Built-in Objects.

(12 Hours)

TEXT BOOK

1. Jon Duckett, (2010), "*Beginning HTML, XHTML, CSS, and JavaScript*", Wiley Publishing.

REFERENCE BOOKS

1. Jennifer Niederst Robbins, Mathews Leon, (2013), "*Learning Web Design – A Beginners guide to HTML, CSS, JAVA SCRIPT and Web Graphics*", 5th Edition, DreamTech Press, New Delhi.
2. Ivan Bayross, (2013), "*Web enabled commercial Application Development using HTML, JavaScript, DHTML and PHP*", 4th Revised Edition, BPB Publications.
3. Deven N. Shah (2012), "*A Complete Guide to Internet and Web Programming*", DreamTech Press, New Delhi

Course Code 24PCAN21N	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	2	2	-	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-
CO3	2	2	2	1	1	2	1	-
CO4	3	1	2	1	1	2	1	-
CO5	3	1	-	-	-	3	1	1

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

Dr. N. Santhi
Head of the Department

Dr. K.S. Jeyalakshmi
Course Designer

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Semester III	**ADVANCED JAVA PROGRAMMING**	Hours/Week: 6	
Core Course-7		Credits: 6	
Course Code **24PCAC31**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : understand the Java Basics, concepts of classes, methods, strings, GUI, Java Bean, Networking and Database connectivity. [K2]

CO2 : apply the basic concepts of Java, fundamentals of classes, methods, Strings and I/O Streams. [K3]

CO3 : illustrate about Applets, Swing, Java Bean, Networking and JDBC. [K3]

CO4 : examine the basic concepts of Java, classes, methods, Strings and I/O Streams. [K4]

CO5 : analyse about Applets, Swing, Java Bean, Networking and JDBC. [K4]

UNIT I

Data Types, Variables, and Arrays: Java is strongly Typed Language - The Primitive Types - Integers - Floating-Point Types - Characters - Booleans - A closer look at Literals - Variables - Type Conversion and Casting- Arrays. **Introducing Classes:** Class fundamentals - Declaring Objects - Assigning Object Reference Variables - Introducing Methods - Constructors - The this keyword - Garbage Collection - The finalize() method.

(18 Hours)

UNIT II

String Handling: The String Constructors - String Length - Special String Operations - Character Extraction - String Comparison - Searching Strings - Modifying a String - Data Conversion using valueOf() - Changing the case of characters within a String - Joining Strings - Additional String Methods - StringBuffer - StringBuilder. **Input/Output:** The I/O Classes and Interfaces – File - The Stream Classes - The Byte Streams - The Character Streams.

(18 Hours)

UNIT III

The Applet Class: Two Types of Applets - Applet Basics - Applet Architecture - An Applet Skeleton - Simple Applet Display methods - Requesting and Repainting - The HTML APPLET Tag - Using the Status Window - Passing Parameters to Applets - getDocumentBase() and getCodeBase() - AppletContext() and showDocument() - The AudioClip Interface - The AudioStub Interface - Outputting to the Console. **Introducing Swing:** The origins of Swing - Swing Is Built on the AWT - Two Key Swing Features - The MVC Connection - Components and Containers - The Swing Packages - A Simple Swing Application - Event Handling.

(18 Hours)

UNIT IV

Java Beans: Introduction - Advantages of Beans - Introspection - Bound and Constrained Properties - Persistence - Customizers - The JavaBeans API - The A Bean Example. **Introducing Servlets:** Background - The Life Cycle of a Servlet - A Simple Servlet -The javax.servlet Package - Reading Servlet Parameters - The javax.servlet.http Package - Handling HTTP Requests and Responses - Using Cookies - Session Tracking.

(18 Hours)

UNIT V

Network Programming: Networking Basics - The Networking Classes and Interfaces - InetAddress - INet4Address and INet6Address - TCP/IP Clients Sockets - URL - URLConnection - TCP/IP Server Sockets - Datagrams. **Databases:** Introduction to Database Management Systems - JDBC - SQL - Using a DBMS - Java DB - Tables, Rows and Columns - Introduction to the SQL SELECT Statement - Inserting Rows - Updating and Deleting Existing Rows - Creating and Deleting Tables - Creating a New Database with JDBC - Scrollable Result Sets. (18 Hours)

TEXT BOOKS

1. Herbert Schildt, (2017), "*Java the Complete Reference*", 10th edition, McGraw Hill Publication.
2. Herbert Schildt, (2014) "*Java the Complete Reference*", 9th edition, McGraw Hill Publication.
3. Tony Goddis, (2106), "*Starting out with Java from Control Structures Through Objects*", 6th Edition, Pearson Education Limited.

REFERENCE BOOKS

1. Herbert Schildt, Dale Skrien, (2103), "*Java Fundamentals – A Comprehensive Introduction*", TMGH Publishing Company Ltd, New Delhi.
2. John Dean, Raymond Dean, (2012), "*Introduction to Programming with JAVA – A Problem Solving Approach*", TMGH Publishing Company Ltd, New Delhi.

Course Code 24PCAC31	**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	3	3	-	-	1	-	-
CO2	3	3	3	3	3	2	2	2	1	1
CO3	3	3	3	3	2	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
Head of the Department

Mrs. R. Nancy Beaulah
Course Designer

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Semester III	**WEB TECHNOLOGY**	Hours/Week: 6	
Core Course-8		Credits: 5	
Course Code **24PCAC32**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : understand the fundamentals of the web and thereby develop web applications using HTML, XHTML, XML, CSS, Javascript, PHP, Angular JS, jQuery. [K2]

CO2 : apply HTML and XHTML documents for presentations using CSS. [K3]

CO3 : apply Javascript, PHP, Angular JS, jQuery to create interactive web applications. [K3]

CO4 : examine the concepts and methodology of HTML, XHTML, XML, CSS, Java script, PHP, Angular JS, jQuery. [K4]

CO5 : analyse the functions of HTML with XHTML, Java script and Angular JS. [K4]

UNIT I

Web Fundamentals and HTML: A Brief Introduction to the Internet - The World Wide Web - Web Browsers - Web Servers - URLs, MIME, HTTP, Security - **Introduction to HTML/XHTML:** Origins and Evolution of HTML and XHTML - Basic Syntax - Standard HTML Document Structure - Basic Text Markup - Images - Hypertext Links - Lists - Tables - Forms - Syntactic differences between HTML and XHTML.

(18 Hours)

UNIT II

Cascading Style Sheets(CSS): Introduction - Levels of style sheets - Style specification formats - Selector forms, Property value forms - Font properties - List properties - Color - Alignment of Text - The Box Model - Background Images – The and tags - Conflict resolution.

(18 Hours)

UNIT III

The Basics of JavaScript: Overview of JavaScript - Object orientation and JavaScript - General Syntactic Characteristics - Primitives - Operations and Expressions - Screen output and Keyboard input - Control statements - Object creation and modification - Arrays - Functions - Constructors - Pattern matching using regular expressions - Errors in Scripts - **JavaScript and HTML Documents**: The JavaScript Execution Environment - The Document Object Model - Elements Access in Java Script - Events and Event Handling - Handling Events from Body Elements - Handling Events from Text Box and password Elements .

(18 Hours)

UNIT IV

Dynamic Documents with Javascript and XML: Introduction - Positioning Elements - Moving Elements - Element Visibility - Changing Color and Fonts - Dynamic Content - Stacking Elements - Locating the Mouse Cursor - Reacting to a Mouse Click - **Introduction to XML:** Introduction - Syntax of XML - XML Document Structure - Document type definitions.

(18 Hours)

UNIT V

PHP, Angular JS and jQuery:

PHP: Overview of PHP - General Syntactic Characteristics - Primitives, Operations, and Expressions - Output - Control Statements - Arrays - Functions - Form Handling - **Angular JS:** Introduction - History - Understanding MVC - Advantages of using AngularJS – Setting up development environment - **jQuery**: Introduction – First jQuery powered web page – Plain Javascript vs. jQuery.

(18 Hours)

TEXT BOOKS

1. Robert W. Sebesta, (2015), "*Programming the World Wide Web*", Seventh Edition, Pearson Education.
2. Felix Alvaro, (2016), "*ANGULARJS: Easy AngularJS For Beginners, Your Step-By-Step Guide to AngularJS Web Application Development*" (AngularJS Series Book 1) Kindle Edition.
3. Jonathan Chaffer, Karl Swedberg, John Resig, "*Learning jQuery", Third Edition: Create better interaction, design, and web development with simple JavaScript techniques"*

REFERENCE BOOKS

1. Dayley Brad, Dayley Brendan, (2015), "*AngularJS, JavaScript, and JQuery All in One", Sams Teach Yourself",* 1st Edition, Kindle Edition.
2. M. Srinivasan, (2009), "*Web Programming Building Internet Applications*", 3rd Edition, Wiley India.
3. Jeffrey C. Jackson, (2012), "*Web Technologies - A Computer Science Perspective*", Pearson Education, 7th Impression.
4. Chris Bates, (2012), "*Web Technology Theory and Practice*", Pearson Education.
5. Raj Kamal, "*Internet and Web Technologies*", McGraw Hill Education.

Course Code 24PCAC32	**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	2	1	1
CO3	2	2	2	3	3	2	2	-	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**

Mrs. R. Nagajyothi — **Course Designer**

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Semester III	**ADVANCED MACHINE LEARNING**	Hours/Week: 6	
Core Course-9		Credits: 5	
Course Code **24PCAC33**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : understand the concepts of Machine Learning and its methods. [K2]

CO2 : apply KNN and Naive Bayes algorithms to solve real-world problems. [K3]

CO3 : make use of regression methods for constructing model trees. [K3]

CO4 : analyse the performance of machine learning models to improve their accuracy. [K4]

CO5 : design new machine learning model based on the applications using existing models [K4]

UNIT I

Introducing Machine Learning: The Origins of Machine Learning, Uses and Abuses of Machine Learning - Basics of Machine Learning Algorithm Model Works - Steps to apply Machine Learning - Choosing a Machine Learning Algorithm - Using Machine Learning concepts - **Managing and Understanding Data:** Data Structures, Vectors and Factors: Lists, Data frames, Matrixes, and arrays - Managing Data - Exploring and Understanding Data: Exploring the Structure of Data, Exploring Numeric variables - Exploring Categorical Variables- Exploring Relationships between Variables.

(18 Hours)

UNIT II

Lazy Learning - Classification Using Nearest Neighbors: The kNN Algorithm - Diagnosing Breast Cancer with the kNN Algorithm - Probabilistic Learning - **Classification Using Naive Bayes:** Basic concepts of Bayesian Methods - The Naïve Bayes Algorithm - Example - filtering Mobile Phone Spam with the Naive Bayes Algorithm - Divide and Conquer - **Classification**

Using Decision Trees and Rules: Understanding Decision Trees - Example - Identifying Risky Bank Loans using C5.0 Decision Trees - Understanding Classification Rules - Example - Identifying Poisonous Mushrooms with Rule Learners

(18 Hours)

UNIT III

Forecasting Numeric Data - Regression Methods: Understanding Regression – Example - Predicting Medical Expenses using Linear Regression - Understanding Regression Trees and Model Trees - Example - Estimating the Quality of Wines with Regression Trees and Model Trees - **Black Box Methods Neural Networks and Support Vector Machines:** Understanding Neural Networks, from Biological to Artificial Neurons, Activation Functions, Network Topology, Training Neural Networks with Backpropagation - Modeling the Strength of Concrete with ANNs - Understanding Support Vector Machines - Performing OCR with SVMs - Finding Patterns -

(18 Hours)

UNIT IV

Market Basket Analysis Using Association Rules: Understanding Association Rules - Example - Identifying Frequently Purchased Groceries with Association Rules. **Finding Groups of Data - Clustering with K-Means:** Understanding Clustering - The k-means Algorithm for clustering - Finding teen market segments using k-means Clustering -

(18 Hours)

UNIT V

Evaluating Model Performance: Measuring Performance for Classification - Beyond Accuracy - other Measures of Performance, Visualizing Performance Tradeoffs - **Improving Model Performance:** Tuning Stock Models for Better Performance - Using Caret for Automated Parameter Tuning - Creating a simple Tuned Model - Customizing the Tuning Process - Improving Model Performance with meta – learning - Understanding Ensembles – Bagging - Boosting- Random forests.

(18 Hours)

TEXT BOOK

Brett Lantz, (2013), "*Machine Learning with R*", Addison-Wesley Packt Publishing.

REFERENCE BOOKS

1. Daniel T. Larose, Chantal D. Larose, (2015), "*Data mining and Predictive analytics*", Second Edition, Wiley Publication.
2. Bertt Lantz, (2019), "*Machine Learning with R: Expert techniques for predictive modeling*", 3rd Edition, Wiley Publication.
3. Jason Bell, (2015), "*Machine Learning: Hands-On for Developers and Technical Professionals*", Wiley Publication.

Course Code	**PO1**		**PO2**		**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
24PCAC33	**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	3	3	3	-	-	1	-	-
CO2	3	2	2	3	2	2	2	2	1	1
CO3	3	3	3	2	2	2	2	-	1	1
CO4	2	2	2	3	2	3	3	2	-	-
CO5	2	2	2	2	1	3	3	3	1	1

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

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Semester III	**ADVANCED JAVA PROGRAMMING PRACTICAL**	Hours/Week: 6	
Core Course - 10 Practical-2		Credits: 4	
Course Code **24PCAC31P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : identify the necessary packages, classes of Java needed for the given problem. [K2]

CO2 : write programs using the necessary Java concepts suitable to the problem. [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 necessary modifications and justify the desired result. [K4]

List of programs:

1. Implementation of Constructors and Destructors with different type of Exception.
2. Implementation of String Functions with different type of Exception.
3. Build a Swing application to implement metric conversion.
4. Use Grid Layout to design a calculator and simulate the functions of a simple calculator.
5. Create a Color palette with a matrix of buttons using Applet.
6. To invoke a servlet from HTML forms.
7. To invoke servlet from Applets.
8. To invoke servlet from JSP.
9. Implement message communication using Network Programming.
10. Write a program to connect databases using JDBC.
11. Implementation of Java Beans.

Course Code 24PCAC31P	**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	-	1	1	-	-	-
CO2	3	3	2	-	3	1	2	2	1	1
CO3	2	2	3	2	3	2	2	2	1	1
CO4	2	2	2	-	2	2	3	2	1	1
CO5	1	1	3	3	2	3	3	3	1	1

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

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Semester III	**WEB TECHNOLOGY PRACTICAL**	Hours/Week: 3	
Elective Course-6 (DSEC)		Credits: 2	
Course Code **24PCAE31P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : gain the knowledge of HTML, CSS, XML, JavaScript, PHP, jQuery and AngularJS. [K2]

CO2 : understand programs using selection/looping statements and inbuilt functions. [K2]

CO3 : write programs using HTML, CSS, XML, JavaScript, PHP, jQuery and AngularJS. [K3]

CO4 : explain the programs implemented using HTML, CSS, XML, JavaScript, PHP, jQuery, AngularJS and deduce the answers for any queries raised. [K3]

CO5 : analyse the created web applications. [K4]

List of Programs:

1. Develop a web page to display your education details in a tabular format.
2. Develop a web page to display your CV on a web page.
3. Design a Homepage having three links: About Us, Our Services and Contact us.
4. Create separate web pages for the three links.
5. Design a web page to demonstrate the usage of inline CSS, internal CSS and external CSS.
6. Design an XML document and create a style sheet in CSS & display the document in the browser.

7. Develop a web page to create image maps.
8. Develop a web page in PHP to fetch details from the database.
9. Design a web page to hide paragraph using JQuery.
10. Create a web page and add javascript code to handle mouse events and form events

Course Code **24PCAE31P**	**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)

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Semester III	**FUNDAMENTALS OF CYBER SECURITY**	Hours/Week: 3	
Elective Course -7 (NME)		Credits: 2	
Course Code **24PCAN31**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : define basic cyber security concepts, including threats, vulnerabilities, and attacks. [K1]

CO2 : explain the principles of cyber security, such as confidentiality, integrity, and availability. [K2]

CO3 : describe common security mechanisms like authentication, encryption, and firewalls. [K2]

CO4 : demonstrate how to implement basic security measures, strong passwords and two-factor authentication. [K3]

CO5 : examine various cyber attacks to understand their effects and how to prevent them. [K4]

UNIT I

History Of Internet - Internet Addresses - DNS - Internet Infrastructure - World Wide Web- Introduction To Cyber Crime - Classification Of Cyber Crimes - Reasons For Commission of Cyber Crimes - Malware And Its Type - Adware - Spyware - Browser Hijacking Software - Virus - Worms - Trojan Horse - Scareware - Kinds Of Cyber Crime - Cyber Stalking - Child Pornography - Forgery And Counterfeiting - Software Piracy And Crime Related To IPRS - Cyber Terrorism - Phishing - Computer Vandalism - Computer Hacking - Creating And Distributing Viruses Over Internet - Spamming - Cross Site Scripting - Online Auction Fraud - Cyber Squatting - Logic Bombs - Web Jacking - Internet Time Thefts- Denial Of Service Attack - Salami Attack - Data Diddling - Email Spoofing.

(9 Hours)

UNIT II

Authentication - Encryption - Digital Signatures - Antivirus - Firewall - Steganography - Computer Forensics - Why Should We Report Cyber Crime? - Introduction - Some Recent Cyber Crime Incidents - Introduction - Counter Cyber Security Initiatives in India.

(9 Hours)

UNIT III

Generating Secure Password - Guideline For Setting Secure Password - Using Password Manager - What Is A Password Manager - Why You Should Use It? - How Does It Work? - Some Popular Password Managers - Enabling Two-Step Verification - Securing Computer Using Free Antivirus - Configuring Firewall On Mac Computer - Turning On And Configuring The Mac OS X Firewall - Working With Windows Firewall In Windows - Firewall In Windows 7 - Configuring Windows Firewall - How To Start & Use The Windows Firewall With Advanced Security - How To Access The Windows Firewall With Advanced Security - What Are The Inbound & Outbound Rules? - What Are The Connection Security Rules? - What Does The Windows Firewall With Advanced Security Monitor?

(9 Hours)

UNIT IV

Finding the best browser according to the users requirement - Safe browsing - How do I know if a website is secure? - Tips for buying online - Clearing cache for browsers - Clearing cache for chrome browsers above version 10 - Clearing cache for chrome browsers from version 1 to 9 - Clearing cache for safari for IOS, iPhone and iPad - Clearing cache for Safari for MAC OS X - Clearing cache for safari for windows - Clearing cache for internet explorer 9, 10 and 11 - clearing cache for Internet Explorer 8 - Clearing cache for Firefox - Clearing cache for Firefox 33 - Clearing cache for opera - Clearing cache for CCleaner - What is wireless LAN? - Major issues with WLAN - secure WLAN - Wi-Fi at home.

(9 Hours)

UNIT V

Safe browsing guidelines for social networking sites - General tips on using social networking platforms safely - Posting personal details - Friends, followers and contacts - Status updates - Sharing online content - Revealing your location - Sharing videos and photos - Instant chats - Joining and creating groups, events and communities - Email security tips - Smartphone Security Guidelines - Purses, Wallets, Smartphones - Platforms, Setup And Installation - Platforms and

Operating Systems - Feature Phones - Branded and locked smartphones - General Setup - Installing and updating applications - Communicating securely (through voice and messages) with a smartphone - Secure Voice Communication - Sending Messages Securely - Storing Information on your Smartphone - Sending Email from your Smartphone - Capturing Media with your Smartphone - Accessing the Internet Securely from your Smartphone - Advanced Smart Phone Security.

(9 Hours)

TEXT BOOK

Dr.Jeetendra Pande, (2017), "*Introduction to Cyber Security*" Published by Uttarakhand Open University.

REFERENCE BOOKS

1. Anthony Reyes, Kevin O'Shea, Jim Steele, Jon R. Hansen, Captain Benjamin R. Jean Thomas Ralph, (2007), "*Cyber-crime investigations" - Bridging the gaps between security professionals, law enforcement and prosecutors".*
2. Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed, (2017), "*Fundamentals of Cyber Security*" BPB Publications.
3. John G.Voller Black and Veatch, (2014), "*Cyber Security*", Wiley & Sons, Inc., Hoboken, New Jersey.

Course Code 24PCAN31	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	-	-	-	-	2	-	-
CO2	3	-	-	-	-	2	-	1
CO3	3	-	-	-	-	2	-	-
CO4	2	2	-	-	-	1	-	-
CO5	2	2	1	1	1	1	2	1

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

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Semester III	**PRACTICE FOR SET/NET – GENERAL PAPER**	Hours/Week: 0	
Self Study Course		Credit: 1	
Course Code **24PGOL31**		Internal 100	External -

COURSE OUTCOMES

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

CO1 : discuss various concepts related to higher education system, teaching communication, research, ICT and environmental studies.[K2]

CO2 : apply the skills of communication, mathematical, internet and research aptitude in competitive examinations. [K3]

CO3 : analyse the circumstances, instances, contents and arrive at / choose the Best option. [K3]

CO4 : evaluate the data using ICT tools and logical reasoning.[K4]

CO5 : develop self-learning activities to face challenges in their life.[K4]

UNIT I

TEACHING & RESEARCH APTITUDE

Teaching: Concept, Objectives, Levels of teaching, Factors affecting teaching, Methods of teaching of Higher learning, Evaluation systems

Research: Meaning, Types, Methods of Research, Steps of Research, Thesis and Article writing, Application of ICT in Research

UNIT II

COMMUNICATION AND HIGHER EDUCATION SYSTEM

Communication: Meaning, Types, Characteristics, Verbal and Non–verbal Communication and Barriers to Communication

Higher Education System: Professional, Technical, Skill Based Education, Value Education, Policies, Governance and Administration

UNIT III

PROSE COMPREHENSION

A text passage followed by a set of questions to be answered based on students' comprehensive ability

UNIT IV

MATHEMATICAL, LOGICAL REASONING AND DATA INTERPRETATION

Mathematical Logical Reasoning: Number series, letter series, Analogies, Venn diagram and Mathematical Aptitude

Data Interpretation: Graphical representation and mapping of Data, Data and Governance

UNIT V

ICT AND ENVIRONMENTAL STUDIES

ICT: General abbreviations, Basics of Internet, E-mail, Digital initiatives in higher education

Environmental Studies: Pollution, Impacts of Pollutants, Natural and energy sources, Natural Disasters and Environmental Protection Act

TEXT BOOK

Madan KVS (2019), NTA – UGC NET/SET/JRF- Teaching and Research Aptitude, Pearson India Education Services Pvt.Ltd., Noida

REFERENCES

Jain, Usha Rani. (2018), *UGC-NET* New Delhi: Mital Books India Ltd.

Singh, Rashmiand Asim Khan (2019), *UGC-NET Paper- I*, New Delhi:Disha Publication.

Course code 24PGOL31	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	-	-	2	1	-	1
CO2	3	3	1	2	3	2	-	2
CO3	3	2	2	3	3	2	-	2
CO4	3	2	3	3	3	3	-	1
CO5	3	1	2	1	1	3	-	1

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

Dr.M.C. Maheswari
Dr. V. Navaneethamani
Heads of the Departments

Mrs. K.Anitha
Dr.S. Malathi
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Semester III	**INTERNSHIP**	Hours/Week: -	
Internship/Industrial Activity		Credits: 2	
Course Code **24PCAI31**		Internal 75	External 25

COURSE OUTCOMES

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

CO1 : utilize appropriate programming languages, tools, and frameworks in software development. [K3]

CO2 : work with databases, APIs, and cloud-based platforms for application integration [K3]

CO3 : apply software development methodologies in project execution. [K3]

CO4 : investigate industry problems, analyze system requirements, and design efficient solutions. [K4]

CO5 : assess the performance of developed applications and suggest improvements. [K5]

Guidelines/ Regulations:

- Each student must go for Internship training in a reputed Industry/Company/ Organization/ Educational Institution.
- Students should produce the Completion Certificate after the Completion of Internship period.
- A report of 15 – 20 pages must be submitted by each student after the completion of the Internship period.
- External Viva-voce examination will be conducted.

Course code 24PCAI31	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	-	-	-	1	-	-
CO2	2	-	2	1	2	2	-	1
CO3	2	-	2	-	2	-	-	-
CO4	2	2	2	2	2	2	-	-
CO5	3	3	3	2	3	-	1	-

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

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Head of the Department

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Semester III	**E-COMMERCE**	Hours/Week: 0	
Extra Credit Course		Credits: 2	
Course Code **24PCAO31**		Internal 100	External -

COURSE OUTCOMES

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

CO1 : understand the basis of E-Commerce and M-Commerce, know the legal framework of E-Commerce.

CO2 : apply payment systems in E-Commerce and M-Commerce.

CO3 : explore the Infrastructure of E-Commerce and M-Commerce.

CO4 : compare the layered architecture of M-Commerce with E-Commerce.

CO5 : analyse the various E-Commerce applications.

UNIT I

What is Electronic Commerce?: **-** Introduction – Types of E-Commerce: Business to customer E-Commerce – Customer to Customer E-commerce – Business to Business E-Commerce. Advantages and Disadvantages of E-Commerce – Supply Chain Management in E-Commerce. **Infrastructure for E-Commerce**: Introduction – Local Area Network: Interconnecting LAN Segments. Public Switched Telephone Network: Broadband Connection to Home PC – ISDN Service – Cable Network – Wireless Networks – Microwave and Satellite Network – Private Communication Networks.

UNIT II

Payment Systems in E-Commerce: Introduction – Requirements of e-payment Systems – Credit Card Payment: Credit Card Payment using Secure Socket Layer – Secure Electronic Transaction (SET) Protocol – Dual Signature Scheme. Electronic Funds Transfer: Automated Cheque Clearance – Electronic Clearing Service. Electronic Cheque Payment: Electronic Clearing of Pay

order – E-cheque Format. Electronic Cash: E-Cash Issue and Spending – Anonymous E-Cash – Smart Card-Based Cash Payment. Payment Gateways: Pay Pal. Micro-payments for Information Goods.

UNIT III

M-Commerce: Introduction – Layered Architecture for m-commerce: Mobile Phone–SMS System – Laptops using Wifi LAN Systems – WAP-Enabled Mobile Hand-held Systems – Location Dependent Services. Mobile Communication Infrastructure – Architecture of GSM Cellular Mobile Wireless System – General Packet Radio Service (GPRS) – CDMA 1xEVDO Rev.A – Short Message Service (SMS). Wireless Application Protocol: Mobile Network Operators – Mobile Handset Manufacturers – Service Provider. WAP Gateway: WAP and i-Mode. Wireless Markup Language: XHTML. Secure Wireless Connectivity: Security of Mobile Network-Internet Connection – WAP Gateway Managed by Sensitive Content Providers – WAP Gateway at Server End.

UNIT IV

M-Commerce: Mobile Payment Methods: SIM Card-enabled Payments – Payments based on SMS – Payment using WAP-enabled Mobile Hand-held Device - Mobile Banking.

E-Commerce of Multimedia: Introduction – E-Publishing of Multimedia – Digitizing and Storing of Books, Audio and Video.

UNIT V

E-Commerce of Multimedia: – Distribution of e-books – Distribution of Audio – Video on Demand - Intellectual Property Issues. **Legal Framework of E-Commerce**: Information Technology Act 2000 – Information Technology (Amendment) Act 2008.

TEXT BOOK:

V. Rajaraman. (2011), "*Essentials of E-Commerce Technology"*, PHI Publications.

REFERENCE BOOKS:

1. Bharat Bhaskar, "*Electronic Commerce – Frame Work Technologies and Applications"*, Tata McGraw Hill.

2. Ravi Kalakota & A.B. Whinston, "*Frontiers of Electronic Commerce"*, Pearson Education.
3. P. T. Joseph. (2002), "*E-Commerce: A Managerial Perspective"*, PHI Publication.
4. https://irp-cdn.multiscreensite.com/1c74f035/files/uploaded/introduction-to-e-commerce.pdf
5. https://backup.pondiuni.edu.in/storage/dde/dde_ug_pg_books/E-%20Commerce.pdf
6. https://nptel.ac.in/content/storage2/courses/106108103/pdf/PPTs/mod13.pdf
7. https://www.tutorialspoint.com/e_commerce/index.htm

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Semester IV	**CRYPTOGRAPHY AND NETWORK SECURITY**	Hours/Week: 6	
Core Course-11		Credits: 5	
Course Code **24PCAC41**		Internal 25	External 75

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

CO1 : understand the concepts of classical encryption techniques and advanced encryption standards. [K2]

CO2 : explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms. [K3]

CO3 : recognize different encryption and decryption techniques to solve problems related to confidentiality and authentication. [K3]

CO4 : examine the usage of existing cryptographic utilities to build programs for secure communication. [K4]

CO5 : analyse the need for digital signatures to secure the document with key management. [K4]

UNIT I

Overview: Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms –A Model for Network Security. **Classical Encryption Techniques:** Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines – Steganography.

(18 Hours)

UNIT II

Block Ciphers and the Data Encryption Standard: Traditional Block Cipher Structure –The Data Encryption Standard – The DES Example – The Strength of DES – Block Cipher Design

Principles. **Basic Concepts in Number Theory and Finite Fields:** Divisibility and the Division Algorithm – The Euclidean Algorithm – Modular Arithmetic – Groups, Rings, and Fields.

(18 Hours)

UNIT III

Advanced Encryption Standard: Finite Field Arithmetic– AES Structure – AES Transformation Functions – AES Key Expansion. **Block Cipher Operation:** Multiple Encryption and Triple DES – Stream Ciphers – RC4. **Public-Key Cryptography and RSA:** Principles of Public-Key Cryptosystems – The RSA Algorithm –Diffe-Hellman Key Exchange – Elgamal Cryptographic System – Elliptic Curve Arithmetic – Elliptic Curve Cryptography.

(18 Hours)

UNIT IV

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions – Two Simple Hash Functions – Requirements and Security – Hash Functions Based on Cipher Block Chaining – Secure Hash Algorithm(SHA) – SHA-3. **Message Authentication Codes:** Requirements – Functions – Security of MACs – MACs Based on Hash Functions: HMAC – **MACs based on Block Ciphers**: DAA and CMAC – Authenticated Encryption: CCM and GCM – Key Wrapping.

(18 Hours)

UNIT V

Digital Signatures: Elgamal Digital Signature Scheme – Schnorr Digital Signature Scheme – NIST Digital Signature Algorithm – Elliptic Curve Digital Signature Algorithm – RSA-PSS Digital Signature Algorithm – Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption – Symmetric Key Distribution Using Asymmetric Encryption – Distribution of Public Keys – X.509 Certificates – Public-Key Infrastructure.

(18 Hours)

TEXT BOOKS

1. William Stallings, "*Cryptography and Network Security – Principles and Practices*", Pearson Education / PHI, 7th Edition.
2. Behrouz A Forouzan, DebdeepMukhopadhyay, "*Cryptography And Network Security*", McGraw Hill Education, 3rd Edition.

REFERENCE BOOKS

1. Bernard Menezes, (20100, "*Network Security and Cryptography*", Cengage, 1st Edition.

2. William Stallings, (2016), "*Cryptography and Network Security*", Sixth Edition, Pearson Education.
3. V.K. Jain, (2016), "*Cryptography and Network Security*", Khanna Book Publishing, New Delhi.
4. C.K. Shyamala, N. Harini, Dr. T. R. Padmanabhan, (2011), "*Cryptography and Security*", Wiley India Pvt. Ltd.

Course Code 24PCAC41	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	2	1	1	1	-	1	-
CO2	3	3	2	1	3	1	2	2	1	1
CO3	2	2	3	2	3	2	2	2	1	1
CO4	2	2	2	1	2	2	3	2	1	1
CO5	2	2	3	3	2	3	3	3	1	1

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

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Semester IV	**INDUSTRY DYNAMICS TECHNOLOGY-DATA VISUALISATION PRACTICAL**	Hours/Week: 6	
Core Course -12 Practical-3		Credits: 4	
Course Code **24PCAC41P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : know the basic functions and operations of R and tableau. [K2]

CO2 : understand the functions of tableau for data process and deploy various charts for applications. [K2]

CO3 : key in the data, execute them to produce charts with neat formatting and prepare the record work. [K3]

CO4 : illustrate the charts using R and tableau features and answer questions related with the charts. [K3]

CO5 : analyze the designs created for real time applications. [K4]

List of Programs:

Note: Use the following Dataset

http://www.tableau.com/sites/default/files/training/global_superstore.zip

Implement the following using R

1. Pie Chart for Sales by Region
2. Bar Chart for Sales by Region and Year
3. Line Chart for Shipmode
2. Scatter Plot for Sales
3. Heat Map for Sales
4. Label Creation in Scatter plot

Implement the following using Power BI

1. Clustered Column Chart
2. Map Creation for Airlines
3. Ribbon Chart for Employee data
4. Sales Analysis using KPI
5. Scatter Chart
6. Dashboard Creation

Implement the following using Tableau

1. Boxplot for Marketing data
2. Bubble Chart for Student data
3. Area Chart

Course Code 24PCAC41P	**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 — **Head of the Department**

Mrs.V.Queen Jemila — **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 IV	**PROJECT**	Hours/Week: 6	
Project		Credits: 5	
Course Code **24PCAC42PR**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : comprehend the objectives, scope, and requirements of the project based on problem statements. [K2]

CO2 : develop software applications using appropriate programming languages, frameworks, and tools. [K3]

CO3 : apply various testing methodologies to validate the functionality, performance, and security of the project. [K3]

CO4 : identify bottlenecks, debug issues, and optimize the codebase to enhance efficiency and maintainability.. [K4]

CO5 : evaluate alternative approaches, and propose future enhancements based on project findings. [K5]

Regulation for the Project

- Project will be done by the final year students individually in the fourth semester under the guidance of respective guides.
- For projects internal marks will be awarded by the respective guide and external marks will be awarded in the external examinations held at the end of the semester.
- The report of the project must be in the prescribed form.
- The project report should be written in 40 - 50 pages.
- Two copies of the project report with binding should be submitted.

Distribution of Marks

Internal Assessment:

Pre-submission Presentation	- 10 Marks
Review	- 20 Marks
One Open Online Course related to the Project	- 10 Marks

External Examination:

Project Report	- 40 Marks
Viva Voce	- 20 Marks

Course Code **24PCAC42PR**	**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	-	-	-	1	-	-
CO2	2	3	-	-	2	1	2	2	-	1
CO3	2	2	-	-	2	-	2	-	-	-
CO4	3	2	2	-	2	2	2	2	-	-
CO5	3	2	3	2	3	2	3	-	1	-

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

Dr. N. Santhi
Head of the Department

Dr. N. Santhi
Course Designer

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Semester IV	**SOCIAL NETWORKS PRACTICAL**	Hours/Week: 6	
Elective Course-8 (Industry)		Credits: 4	
Course Code **24PCAE41P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : know the fundamental techniques and tools of social networks. [K2]

CO2 : understand and develop the programs using the tools required to develop and manage social networks like Facebook, and LinkedIn. [K2]

CO3 : experiment with the functionality of social networking tools such as GitHub [K3]

CO4 : apply and review the fundamental principles for social network graphs. [K3]

CO5 : analyze the existing API for social networks. [K4]

List of programs:

1. Linear Regression Coefficient
2. Gender Prediction Using Supervised Learning Algorithm
3. Extraction of Noun, Verb, Adjective
4. Frequency Words After Removing Stopwords
5. Movie Review Using Naïve Bayes Classifier
6. Mail Filtering Using Naïve Bayes Classifier
7. Data Visualization
8. Data Cleaning Techniques and Data Preprocessing
9. Decision Tree
10. K-Means Classifier
11. Plotting Using PNG
12. Twitter Analysis

13. Query Using TF-IDF
14. Gender Prediction By Name
15. GitHub Interested Graph

Course Code **24PCAE41P**	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	2	-	-	-	1	-	-
CO2	3	3	-	-	2	1	2	2	-	1
CO3	2	2	-	-	2	-	2	-	-	1
CO4	3	2	2	-	2	2	-	2	1	-
CO5	3	3	3	2	2	2	3	-	1	-

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

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Semester IV	**PRACTICE FOR SET/NET – PAPER II COMPUTER SCIENCE**	Hours/Week: 6	
Skill Enhancement Course / Professional Competency Skill		Credits: 3	
Course Code **24PCAS41**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : gain the basic knowledge of the core concepts of computer science. [K1]

CO2 : understand the concepts of boolean algebra, programming, database management, data structures, memory and process management, networking and communications to solve practical problems. [K2]

CO3 : know the importance of IP protocol, deadlock algorithms, software models, normalization forms. [K2]

CO4 : apply SQL queries to create, manipulate, and manage databases, and apply software engineering principles in development [K3]

CO5 : analyze software systems and database designs, considering performance and efficiency factors. [K4]

UNIT I

Computer Architecture: Prepositional Logic - Predicate Logic, Welf-formed formulae (WFF), Satisfiability and Tautology. **Logic Families**: TTL, ECL, and C-MOS gates, Boolean Algebra and Minimization of Boolean functions, Flip-flops Types, Race Condition and Comparison. Design of Combinatorial Circuits. **Representation of Integers**: Octal, Hex, Decimal, and Binary, 2's complement and 1's Complement Arithmetic, Floating Point Representation.

(18 Hours)

UNIT II

Programming in C: Element of C - Tokens - Data Types in C- Control Structures in C – Sequence – Selection and iterations – Structured Data Types in C - Arrays - Struct - Union - String

– Pointers. **Object Oriented Programming Concepts**: Class and Objects – Instantiation - Inheritance – Polymorphism and Overloading. **C++ Programming:** Elements of C++ - Tokens – identifiers – Variables and Constants – Data types – Operators – Control Statements – Functions Parameter Passing – Class and Objects – Constructors and destructors – Templates – Exception handling.

(18 Hours)

UNIT III

Relational Database Design and SQL: E-R Model - Normalization – 1NF, 2NF, 3NF, BCNF and 4NF, Limitations of 4NF and BCNF. **SQL**: Data Definition Language (DDL) – Data Manipulation Language (DML) – Data control Language (DCL) commands – Database objects like – Views – Indexes. **Software Engineering:** System Life Cycle Models – Water fall model – Prototypes – Spiral model. Software Metric**s –** Preliminary Analysis **–** COCOMO – Cohesion – Coupling – Software Testing – Verification and Validation. **Data Structures**: Abstract Data Type – Stacks – Queues – Linked Lists – Trees – Graphs – Priority Queues – Heaps.

(18 Hours)

UNIT IV

Operating System: What is an Operating System? – System Call – Evolution of Operating Systems – Serial Processing – Batch Processing. **Process Management**: Process Concept – Process Hierarchies – Process Implementation. **Types of Scheduling**: FIFO – Round Robin Scheduling – Priority based Scheduling – **Deadlocks:** System Model – Deadlock Characterization and Modeling. **Memory Management:** Single Process Monitor – Multiprogramming with fixed partition – Multiprogramming with dynamic partitions. Paging - Virtual Memory – Disk Organisation – Disk Scheduling. **Software Engineering:** System Life Cycle Models – Water fall model – Prototypes – Spiral model. Software Metric**s –** Preliminary Analysis **–** COCOMO – Cohesion – Coupling – Software Testing – Verification and Validation.

(18 Hours)

UNIT V

Computer Networks: Network Fundamentals: Local Area Networks (LAN) – Metropolitan Area Networks (MAN), Wide Area Networks (WAN) – Wireless Networks **-** Inter Networks**.** **Reference Models**: The OSI model – TCP/IP model. **Data Communication:** Channel Capacity – Transmission Media – Twisted Pair – Coaxial Cables – Fiber-optic Cables – Wireless transmission – Ratio – Microwave – Infrared and Millimeter Waves – Lightwave Transmission Telephones – Local Loop – Trunks and Multiplexing – ATM - Communication Satellites –

Geosynchronous and Low-orbit. – Concatenated Virtual Circuits – Tunnellings – Fragmentation – Routing : Virtual Circuits and Datagrams – Routing Algorithms – Congestion Control.

(18 Hours)

TEXT BOOK

1. Chandresh Shah, Saurab Mishra, "*UGC NET/JRF/SET Computer Science & Applications (Paper II & Paper III)*", Upkar Prakashan, Agra-2.

REFERENCE BOOKS

1. Surabhi Sharma and Kailash Chandra Gururani, (2024), "*NTA UGC NET/JRF/SET 2025 – Study Guide Computer Science & Applications – Paper – 2*", Arihant Publications.
2. Sanjay Singhal and Sameer Mishra, (2024), "*UGC NET/SET Computer Science and Applications*", Trueman Book Company.

Course Code **24PCAS41**	**PO1**		**PO2**		**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
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CO3	3	3	2	2	2	3	3	2	-	2
CO4	3	3	2	2	3	3	3	3	-	1
CO5	3	3	1	1	2	1	1	3	-	1

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

Dr. N. Santhi
Head of the Department

Mrs. B. Sakthi
Course Designer