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, 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, 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 Health	III	24PHSN31	Nutrition and Dietetics
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 Science (SF)

To promote academic excellence by inculcating the quest for continuous learning, intensive research thereby making students' professionally competent graduates and responsible citizens to outreach wider community.

Mission of the Department of Computer Science (SF)

➢ To offer an in depth knowledge of the subject.
➢ To groom the graduates with good attitude, team work and personality skills
➢ To promote original inquiry and innovations.
➢ To co-ordinate knowledge, skills and attitude towards successful career.
➢ To impart moral, ethical and social responsibilities to students

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.Sc. COMPUTER SCIENCE Programme The Students will be able to

PEO1 - utilize the gained knowledge and adapt current emerging technologies throughindependent thinking in the rapid changing world.

PEO2 - enhance the technocrats as successful computer professionals, researchers orentrepreneurs with global competence.

PEO3 - acquire professional integrity, moral ethics and become responsible forsustainable development of society and industrial needs through research outcomes.

Key Components of Mission Statement	Programme Educational Objectives		
	PEO1	PEO2	PEO3
in-depth Knowledge	√	√	-
good attitude, team work and personality skills	-	√	√
promote inquiry and innovation	-	√	√
knowledge, skills and attitude	√	√	√
moral ethical and social responsibility	-	-	√

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.Sc. Computer Science Programme,
the students will be able to**

PO 1: *Disciplinary Knowledge*

PSO 1.a: explore in depth knowledge in diverse areas of Computer Science and advanced programming skills to carry research.

PSO 1.b: adapt to new computing technologies with broad range of programming languages and open source platforms for attaining professional excellence and entrepreneurial skill.

PO2: *Communication Skills*

PSO 2: effectively communicate the concepts and ideas of new emerging technologies in computer science through effective reports, documentation and clear presentations.

PO3: *Scientific Reasoning and Problem Solving*

PSO 3: apply the attained knowledge in computer science for problem solving and in developing new application software.

PO4: *Critical thinking and Analytical Reasoning*

PSO 4: integrate the acquired knowledge with social concern and responsibility to become an efficient entrepreneur and member of the workforce to improve the standard of living in society.

PO5: *Research Related Skills*

  PSO 5: enhance technical skills to promote interdisciplinary research in various domains of computer science to fulfill the needs of the society.

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

  PSO 6a: use online collaboration tools like google classroom, youtube channel, slide share and MOOC platform to negotiate content to enhance their learning behaviour through green environment.

  PSO 6b: adapt to new technologies and constantly upgrade their technical skills with an attitude towards independent and lifelong learning to become successful in computer industry.

PO7: *Cooperation/Team Work and Multicultural Competence*

  PSO 7: implement and evaluate the software projects as a member in a team by utilizing modern software tools.

PO8: *Moral and Ethical awareness*

  PSO 8: promote ethical values and make them professionally responsible with the ability to relate computer applications to broader social context for the growth of the nation.

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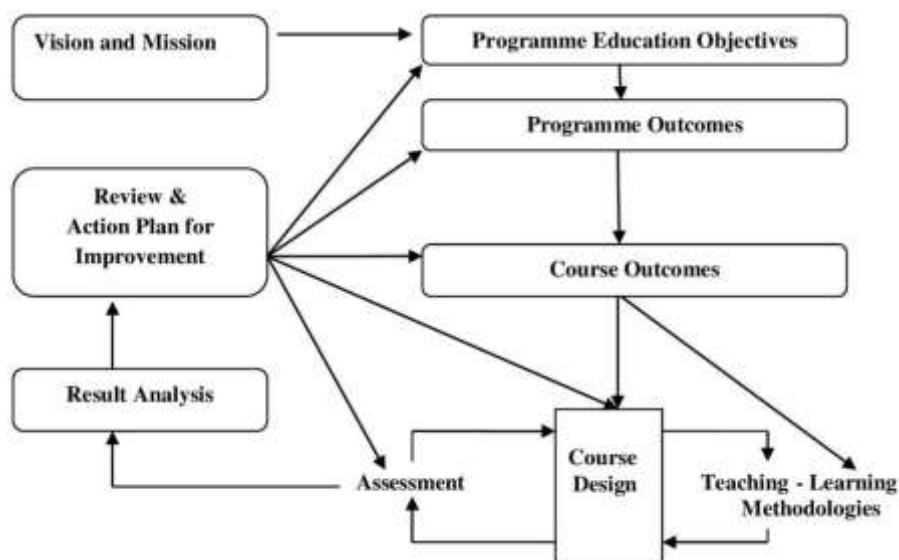
It is important to determine the methods of assessment. A comprehensive assessment strategy may be outlined using the revised Bloom's Taxonomy levels.

BLOOM'S TAXONOMY
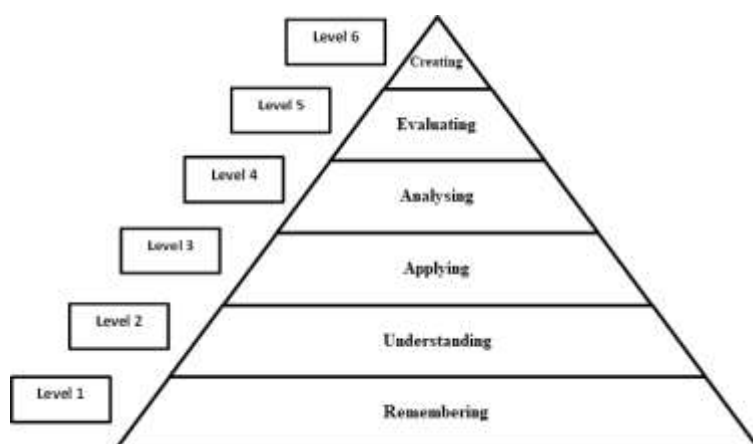
CO - PO Mapping of Courses

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/ PSO 1	PO2/ PSO 2	PO3/ PSO 3	PO4/ PSO 4	PO5/ PSO 5	PO6/ PSO 6	PO7/ PSO 7	PO8/ PSO 8
CO1								
CO2								
CO3								
CO4								
CO5								

ELIGIBILITY FOR ADMISSION

Candidate for admission to the M.Sc. (Computer Science) Course (Full Time) should posses a Bachelors Degree of this University or as an Examination accepted as equivalent there to, with a minimum aggregate of 45% marks in Part III subjects other than languages and mathematics subject as ancillary.

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

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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	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	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	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	Fill in & Sentence Form	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)**

4 weeks 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 prescribed Courses 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 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 ≥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.Sc. Computer Science Programme.

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VIRUDHUNAGAR
Quality Education with Wisdom and Values

MASTER OF COMPUTER SCIENCE (7016)

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 (5)	6 (5)	24 (20)
Core Course	6 (5)	6 (5)	6 (5)	-	18 (15)
Core Course	-	-	6 (5)	-	6 (5)
Core Course Practical	6 (4)	6 (4)	6 (3)	6 (4)	24 (15)
Project	-	-	-	6 (5)	6(5)
Elective Course (DSEC)	6 (4)	4 (3)	3 (3)	-	13 (10)
Elective Course (Generic)	6 (4)	4 (3)	-	-	10 (7)
Elective Course(NME)	-	4 (2)	3 (2)	-	7 (4)
Elective Course- (Industry / Entrepreneurship)	-	-		6 (3)	6 (3)
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 (22)**	**30 (22)**	**30 (26)**	**30 (21)**	**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

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 Mining and Warehousing	24PCSC21	6	5	3	25	75	100
2	Core Course - 5	Advanced Operating Systems	24PCSC22	6	5	3	25	75	100
3	Core Course - 6 Practical II	Data Mining Practical using R	24PCSC21P	6	4	3	40	60	100
4	Elective Course - 3 (DSEC)	Multimedia and its Applications	24PCSE21N	4	3	3	25	75	100
5	Elective Course - 4 (Generic)	Optimization Techniques	24PCSE22	4	3	3	25	75	100
6	Elective Course - 5 (NME)	Web Programming	24PCSN21	4	2	3	25	75	100
			Total	**30**	**22**				**600**

DSEC **-** Discipline Specific Elective Course

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	24PCSC31	6	5	3	25	75	100
2	Core Course - 8	Network Security and Cryptography	24PCSC32	6	5	3	25	75	100
3	Core Course - 9	Cloud Computing	24PCSC33	6	5	3	25	75	100
4	Core Course -10 Practical III	Advanced Java Programming Practical	24PCSC31P	6	3	3	40	60	100
5	Elective Course - 6 (DSEC)	Web Services	24PCSE31	3	3	3	25	75	100
6	Elective Course - 7 (NME)	Python Programming	24PCSN31	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	24PCSI31	-	2	-	75	25	100
			Total	**30**	**26**				**800**

Extra Credit Course

S.No.	Components	Title of the Course	Course Code	Hours per Week	Credits	Exam. Hours	Marks		
							Int.	Ext.	Total
1.	Extra Credit Course	Robotic Process Automation	24PCSO31	-	2	3	**100**	**-**	**100**

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	Data Science and Analytics	24PCSC41	6	5	3	25	75	100
2	Core Course - 12 Practical IV	Web Application Development and Hosting Practical	24PCSC41P	6	4	3	40	60	100
3	Project	Project	24PCSC42PR	6	5	-	40	60	100
4	Elective Course -8 (Industry)	Internet of Things	24PCSE41	6	3	3	25	75	100
5	Professional Competency Skill	Computer Science for Competitive Examinations	24PCSS41	6	3	3	25	75	100
6		Extension Activity		-	1	-	100	-	100
			Total	**30**	**21**				**600**

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M.Sc. COMPUTER SCIENCE

(2025-2026 onwards)

Semester II	MULTIMEDIA AND ITS APPLICATIONS	Hours/Week: 4	
Elective Course - 3 DSEC		Credits: 3	
Course Code **24PCSE21N**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: Understand the basic concepts of Multimedia. [K2]

CO2: apply different multimedia elements such as text, images, sound, animation, and video, and explain how they are correlated in multimedia projects. [K3]

CO3: develop a multimedia portfolio that showcases their skills and creativity in designing and developing multimedia content and designing a visually appealing presentation. [K3]

CO4: examine multimedia development tools and techniques to create functional and interactive multimedia systems. [K4]

CO5: analyse multimedia skills in real-world scenarios, including understanding the applications of multimedia in various industries and creating a portfolio of multimedia projects. [K4]

UNIT I

What is Multimedia? Definitions – Where to Use Multimedia – Delivering Multimedia. Text: Using Text in Multimedia - Computers and Text: Character Sets and Alphabets – Font Editing and Design Tools – Hypermedia and Hypertext. (12 Hours)

UNIT II

Images: Making Still Images – Color: Computerized Color – Image File Formats. (12 Hours)

UNIT III

Sound: Digital Audio – MIDI Audio – MIDI vs. Digital Audio - Multimedia System Sounds – Audio File Formats. **Animation:** The Power of Motion – Principles of Animation – Animation by Computer: Animation Techniques – Making Animations That Work: A Rolling Ball. (12 Hours)

UNIT IV

Video: How Video Works and Is Displayed: Digital Video – Displays – Digital Video Containers – Obtaining Video Clips - Shooting and Editing Video. (12 Hours)

UNIT V

Making Multimedia: The Stages of a Multimedia Project - What You Need: Software. **Multimedia Skills:** The Team: Multimedia Designer – Interface Designer – Multimedia Programmer. (12 Hours)

SELF STUDY:

Adding Sound to Multimedia Project (Pages : 124 -133)

TEXT BOOK

Tay Vaughan(2011). *Multimedia Making It Work*, 8th edition, Tata Mc Graw Hill

UNIT	CHAPTERS	PAGES
I	1	1 - 12
	2	25 - 40, 42 - 44, 50 - 60
II	3	70 - 88, 91 - 94, 97
III	4	106 – 123
	5	140 – 152
IV	6	168 – 181
V	7	196, 197, 212 - 222
	8	243 - 246, 251,252

REFERENCE BOOKS

1. Ralf Steinmetz & Klara Nahrstedt. (2012). *Multimedia Computing, Communication & Applications*, Pearson Education.

2. Ranjan Parekh. (2013). *Principles of Multimedia,* 2nd Edition, McGraw Hill Education Private Limited, India.

WEB RESOURCE

https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/

Course Code 24PCSE21N	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	2	2	2	1	1	2	2	2	-
CO2	3	2	2	2	1	1	3	2	2	-
CO3	3	2	2	2	2	2	3	2	3	-
CO4	3	2	3	2	2	2	3	2	3	-
CO5	3	3	3	2	3	2	3	2	3	1

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

Mrs. P. Aruna Devi   Mrs. S. Veni
Head of the Department   **Course Designer**

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M.Sc. COMPUTER SCIENCE

(2024-2025 onwards)

Semester III		Hours/Week: 6	
Core Course 7	**ADVANCED JAVA PROGRAMMING**	Credits: 5	
Course Code		Internal	External
24PCSC31		25	75

COURSE OUTCOMES

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

CO1: understand the advanced concepts of Java Programming. [K2]

CO2: apply the concepts of multiple threads, networking, RMI and event handling mechanism. [K3]

CO3: implement database operations for any applications, create dynamic web pages using Applets, JSP and Servlet technology, improve the performance of java through collection framework and use GUI toolkit Swing for building applications. [K3]

CO4: compare the concepts such as multithreading with multiplexing, different networking classes and the event handling mechanisms. [K4]

CO5: examine server side scripting programs using JSP, Servlet, RMI, performance of java classes through collection framework, Swing and Applet Classes.[K4]

UNIT I

Multithreading and Multiplexing: Thread Basics – Using Threads in Java: Extending the Thread Class – Explicitly Implementing the Runnable Interface – Synchronising Threads. **Networking:** Networking Basics – The networking classes and interfaces – InetAddress – Inet4Address & INet6Address – TCP/IP Client Sockets – URL – URL Connection – The HTTP URL Connection – The URI Class – Cookies – TCP/IP Server sockets – Datagrams. (18 Hours)

UNIT II

Remote Method Invocation (RMI): The Basic RMI Process – Implementation Details – Compilation and Execution – Using RMI Meaningfully – RMI Security.

Event Handling: Two Event Handling Mechanisms – The Delegation Event Model – Event Classes– Sources of Events – Event Listener Interfaces. (17 Hours)

UNIT III

The Java Database Connectivity (JDBC): Creating an ODBC Data source – Simple Database Access – Modifying the Database Contents – Transactions – Meta Data – Using a GUI to access a Database – Scrollable Result Sets in JDBC 2.0 – Modifying Databases via Java Methods – Using the Data Source Interface. **The Applet Class:** Two Types of Applets – Applet Basics – Applet Architecture – An Applet Skeleton – Simple Applet Display Methods – Requesting Repainting – Using the Status Window – The HTML APPLET Tag – Passing Parameters to Applets – getDocumentBase() and getCodeBase().

(18 Hours)

UNIT IV

Java Server Pages (JSPs): The Rationale behind JSPs – Compilation and Execution – JSP Tags – Collaborating with Servlets – JSPs in action – Error Pages – Using JSPs to Access Remote Databases. **Servlets:** Background – The Life Cycle of a Servlet – Using Tomcat for Servlet Development – A Simple Servlet – The Servlet API – 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

The Collections Framework: Collections Overview – Recent Changes to Collections – The Collection Interfaces – The Collection Classes – Accessing a Collection via an Iterator – Storing User - Defined Classes in Collections. **Introducing Swing:** Event Handling. **Exploring Swing:** JLabel and Image Icon – JTextField – The Swing Buttons – JTabbedPane – JScrollPane – JList – JComboBox – Trees – JTable – Continuing Your Exploration of Swing. (19 Hours)

SELF STUDY

UNIT IV: Implicit JSP Objects – Pages: 274-276

TEXT BOOKS

1. Herbert Schildt (2007). *Java The Complete Reference*, Mumbai: Tata McGraw Hill Edition, Seventh Edition.

2. Jan Graba (2010). *Introduction to Network Programming with Java*, United States: Springer International Edition.

UNIT	TEXT BOOKS	CHAPTERS	PAGES
I	T2	3	47 - 56, 63 – 70
	T1	20	599 – 616
II	T2	5	129 – 147
	T1	22	637 – 653
III	T2	7	182 - 192, 195 – 222
	T1	21	617 – 632
IV	T2	9	269 – 274, 276-286
	T1	31	907 – 928
V	T1	17	437 – 463
		29	868 – 871
		30	879 – 906

REFERENCE BOOKS

1. Joseph L.Webber. (May 2000). *Special Edition Using Java2 Platform*, New Delhi: Prentice Hall of India, Fifth Printing.

2. Dr.Satyaraj Pantham .(2002). *Pure JFC Swing*, New Delhi: Tech media Publications.

3. Phil Hanna. *The Complete Reference JSP 2.0*, Mumbai: Tata McGraw Hill Edition.

Course Code 24PCSC31	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	3	3	3	1	1	-	3	3	-	-
CO2	3	3	3	1	1	-	3	3	-	-
CO3	3	3	3	2	2	1	3	2	-	1
CO4	2	2	3	2	2	1	3	2	-	2
CO5	2	2	3	3	3	-	3	3	-	2

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

Mrs. P.Aruna Devi   Mrs. S.Veni

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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M.Sc. COMPUTER SCIENCE

(2024-2025 onwards)

Semester III		Hours/Week: 6	
Core Course 8	**NETWORK SECURITY AND CRYPTOGRAPHY**	Credits: 5	
Course Code		Internal	External
24PCSC32		25	75

COURSE OUTCOMES

On completion of course, the learners will be able to

CO1: summarize various concepts in network security and cryptography [K2]

CO2: implement various encryptionalgorithms, hash functions, digital signature algorithm. [K3]

CO3: use block ciphers, encryption standards, public key cryptosystems, digital signature protocols, authentication protocols and Network Security. [K3]

CO4: analyze and resolve security issues in authentication protocols and security policies.[K4]

CO5: examine the performance of encryption standard algorithms, hash algorithms, message authentication functions and authentication services for security. [K4]

UNIT I

Computer and Network Security Concepts: OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – A Model for Network Security – **Classical Encryption Techniques:** Symmetric Cipher Model – Substitution Techniques – Transposition Techniques. **Block Ciphers and the Data Encryption Standard:** Traditional Block Cipher Structure –The Data Encryption Standard – The Strength of DES – Block Cipher Design Principles. **Advanced Encryption Standard:** AES Structure – AES Transformation Functions. (18 Hours)

UNIT II

Public Key Cryptography and RSA: Principles of Public Key Cryptosystem – The RSA Algorithm. **Other Public Key Cryptosystems:** Diffie-Hellman Key Exchange. **Cryptographic Hash Functions**: Applications of Cryptographic Hash Functions – Requirements and Security – Secure Hash Algorithm. (18 Hours)

UNIT III

        Message Authentication Codes: Message Authentication Requirements – Message Authentication Functions – Requirements for Message Authentication Codes – MACs Based on Hash Functions HMAC. **Digital Signatures:** Digital Signatures – ELGAMAL Digital Signature Scheme. **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)

UNIT IV

        User Authentication: Remote User Authentication Principles – Remote User Authentication using Symmetric Encryption – KERBEROS. **Transport Level Security:** Web Security Considerations – Transport layer Security.   (18 Hours)

UNIT V

        Electronic-Mail Security: S/MIME **-** Pretty Good Privacy. **IP Security:** IP Security Overview – IP Security Policy – Encapsulating Security Payload. **Case Study:** Implementation of Cryptographic Algorithms – RSA (Java Programming) – Network Forensic.   (18 Hours)

SELF STUDY

        Digital Signatures: ELGAMAL Digital Signature Scheme (Pages : 424-425)

TEXT BOOK

     William Stallings. C*ryptography and Network Security: Principles and Practices,*7ᵗʰ Edition, Pearson Education.

UNIT	CHAPTERS	SECTIONS
I	1	1.2 – 1.5,1.8
	3	3.1 – 3.3
	4	4.1 - 4.2,4.4
	6	6.2 - 6.3
II	9	9.1 – 9.2
	10	10.1
	11	11.1,11.3,11.5
III	12	12.1 – 12.3,12.5
	13	13.1 – 13.2
	14	14.1 – 14.5

20ᵗʰ Academic Council Meeting 30.05.2025

IV	**15**	**15.1 – 15.3**
	17	**17.1 – 17.2**
V	**18**	**18.1 - 18.2**
	19	**19.4 - 19.5**
	20	**20.1 – 20.3**

REFERENCE BOOKS

1. John E. Hershey. *Cryptography Demystified*, McGraw-Hill Publication.

2. Bruce Schneier. (2008). *Applied Cryptography*, 2nd Edition, John Willey & Sons.

3. WenboMao. (2014). *Modern Cryptography*, 2nd Edition, Pearson Education.

4. Roberta Bragg. Mark Rhodes & Keith Strassberg (2014). *Complete Reference Network Security*, Tata McGraw Hill Edition.

Course Code 24PCSC32	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	3	3	3	2	1	2	3	3	2	2
CO2	3	2	2	2	2	1	2	2	2	2
CO3	3	2	2	2	2	2	2	2	1	2
CO4	3	2	2	2	2	2	2	3	1	1
CO5	3	3	2	2	2	2	2	3	1	1

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

Mrs. P.Aruna Devi   Mrs.R.Sabitha

Head of the Department   **Course Designer**

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(2024-2025 onwards)

Semester III		Hours/Week: 6	
Core Course 9	**CLOUD COMPUTING**	Credits: 5	
Course Code		Internal	External
24PCSC33		25	75

COURSE OUTCOMES

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

CO1: determine the fundamental concepts of cloud computing, including its history, working principles, benefits, and limitations. [K2]

CO2: demonstrate the use of cloud computing for personal, community, and corporate applications, such as email management, scheduling, and project collaboration.[K3]

CO3: utilize cloud-based services for task management, event management, contact management, and document collaboration. [K3]

CO4: compare and evaluate different web-based communication tools, online collaboration platforms, and social networking tools for effective teamwork. [K4]

CO5: assess various cloud storage, file-sharing, and online content management services, including their security, accessibility, and usability. [K4]

UNIT I

Beyond the Desktop: An Introduction to Cloud Computing: Cloud Computing: What It Is and What It Isn't – From Collaboration to the Cloud: A Short History of Cloud Computing – The Network Is the Computer: How Cloud Computing Works. **Are You Ready for Computing in the Cloud :** The Pros and Cons of Cloud Computing – Benefits from Cloud Computing. **Developing Cloud Services:** Types of Cloud Service Development – Discovering Cloud Services Development Services and Tools.   (18 Hours)

UNIT II

Cloud Computing for the Family: Centralizing Email Communications. **Cloud Computing for the Community:** Collaborating on Schedules – Collaborating on Group Projects and Events. **Cloud Computing for the Corporation:** Managing Schedules – Managing Projects – Presenting on the Road. **Collaborating on calendars Schedules and task management:** Exploring Online Scheduling Applications – Exploring Online Planning and Task Management. **Collaborating on Event Management:** Understanding Event Management Applications**.**   (17 Hours)

UNIT III

Collaborating on Contact Management: Understanding Contact Management and CRM – Exploring Contact Management and CRM Applications. **Collaborating on Project Management:** Understanding Project Management – Exploring Project Management Applications. **Collaborating on Word Processing:** How Web-Based Word Processing Works – Exploring Web-Based Word Processors**.**

(19 Hours)

UNIT IV

Collaborating via Web-Based Communication Tools: Evaluating Web Mail Services – Evaluating Instant Messaging Services – Evaluating Web Conferencing Tools. **Collaborating via Social Networks and Groupware:** Creating Groups on Social Networks – Evaluating Online Groupware. **Collaborating via Blogs and Wikis:** Evaluating Blogs for Collaboration – Evaluating Wikis for Collaboration.   (18 Hours)

UNIT V

Storing and Sharing Files and Other Online Content: Understanding Cloud Storage – Evaluating Online File-Storage and -Sharing Services – Exploring Online Bookmarking Services. **Sharing Digital Photographs:** Exploring Online Photo-Editing Applications – Exploring Photo-Sharing Communities. **Controlling It All with Web-Based Desktops:** Understanding Web-Based Desktops – Evaluating Web-Based Desktops.   (18 Hours)

SELF STUDY

Collaborating on Spreadsheets (Page No: 165 – 178)

TEXT BOOK

Michael Miller. (2009). *Cloud Computing*, Pearson Education, New Delhi.

UNIT	CHAPTERS	PAGE NUMBERS
I	1	8 - 19
	2	24 - 33
	3	40 - 46
II	4	52 - 53
	5	62 - 68
	6	72,74,79 - 80
	7	97 - 105
	8	108 - 111
III	9	121 - 134
	10	137 - 144
	11	147 - 162
IV	18	248 - 263
	19	265 - 274
	20	277 - 283
V	15	208 - 218
	16	222 - 234
	17	236 - 242

REFERENCE BOOKS

1. Anthony T. Velt. (2009). *Cloud Computing - A Practical Approach*, Tata Mcgraw Hill Education Private Limited.

2. Rittinghouse, John W., and James F. Ransome. (2017). *Cloud Computing: Implementation, Management and Security*, CRC Press.

3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi. (2013). *Mastering Cloud Computing*, Tata Mcgraw Hill.

WEB RESOURCES

1. https://nptel.ac.in/courses/106/105/106105167/
2. https://www.tutorialspoint.com/cloud_computing/index.htm
3. https://www.javatpoint.com/cloud-computing-tutorial

Course Code 24PCSC33	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	2	-	3	1	2	-	2	1	-	-
CO2	2	1	2	1	-	1	2	1	-	-
CO3	2	2	3	-	1	2	3	2	-	3
CO4	2	2	3	2	2	3	2	3	-	-
CO5	2	3	3	3	2	3	1	3	-	-

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

Mrs. P.Aruna Devi   Mrs.V.Subhasini
Head of the Department   **Course Designer**

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(2024-2025 onwards)

Semester III		Hours/Week: 6	
Core Course - 10 Practical III	**ADVANCED JAVA PROGRAMMING PRACTICAL**	Credits: 3	
Course Code		Internal	External
24PCSC31P		40	60

COURSE OUTCOMES

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

CO1: write coding for importing required packages and creating main method class in all Java application programs. [K2]

CO2: understand the applicable Java programs concepts that should be used for the specified problem. [K2]

CO3: develop Java Applets and Web applications proficiently. [K3]

CO4: construct java console application programs and evaluate the performance and the completion of their record work. [K3]

CO5: modify networking protocols used in the Java application program, Servlets to JSP programs and vice-versa. [K4]

List of programs:

1. Display a welcome message using Servlet.

2. Design a Purchase Order form using HTML form and Servlet.

3. Develop a program for calculating the percentage of marks of a student using JSP.

4. Design a Purchase Order form using HTML form and JSP.

5. Prepare an Employee pay slip using JSP.

6. Prepare EB Bill using JSP.

7. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records.

8. Write a program using Java servlet to handle form data.

9. Write a simple Servlet program to create a table of all the headers it receives along with their associated values.

10. Write a servlet program to perform library management.

11. Write a program in JSP by using session object.

12. Write a program to build a simple Client Server application using RMI.

13. Create an applet for a calculator application.

14. Create an applet to display seven wonders.

15. Program to send a text message to another system and receive the text message from the system (use socket programming).

Course Code 24PCSC31P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	3	3	3	1	1	-	3	3	3	-
CO2	3	3	3	1	1	1	3	3	3	1
CO3	3	3	3	1	1	1	3	3	3	1
CO4	2	1	3	2	2	1	3	3	1	1
CO5	2	1	2	2	2	-	1	3	1	2

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

Mrs. P. Aruna Devi
Head of the Department

Mrs. M. Sangeetha Alias Sheeba
Course Designer

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Re-accredited with 'A++' Grade (4ᵗʰ Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.Sc. COMPUTER SCIENCE

(2024-2025 onwards)

Semester III		Hours/Week: 3	
Elective Course-6 DSEC	**WEB SERVICES**	Credits: 3	
Course Code **24PCSE31**		Internal 25	External 75

COURSE OUTCOMES

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

CO1:   describe the fundamentals of web Services, technologies, protocols and quality of service. [K2]

CO2:   illustrate the platforms available for web services, processing of XML documents and quality of service. [K3]

CO3:   demonstrate the protocols required for web services. [K3]

CO4:   analyze technologies, industry standards, QoS enabled applications for web services. [K4]

CO5:   examine various models such as SOAP, WSDL, UDDI and WSCL. [K4]

UNIT I

Introduction: Web services – Important of Web Services – Web services and Enterprises. **XML Fundamentals**: XML – XML documents – XML Namespaces.

(8 Hours)

UNIT II

XML : XML Schema –Processing XML. **SOAP and WSDL:** The SOAP model – SOAP messages – SOAP encoding.   (10 Hours)

UNIT III

WSDL: WSDL structure – The Stock Quote WSDL Interface – Definitions – The Types Element – Bindings – Services – Managing WSDL Descriptions – Extending WSDL. Using SOAP and WSDL . UDDI: About UDDI – The UDDI Business Registry – UDDI Under the Cores – Accessing UDDI.   (10 Hours)

40

UNIT IV

Advanced Web Services Technologies and Standards: Conversations Overview – Web Services Conversation Language – WSCL Interface Components. **Workflow:** Business Process Management – Workflows and Workflow Management Systems. (9 Hours)

UNIT V

Quality of Service: QoS – Importance of QoS for web services – QoS Metrics – Where Are the Holes – Design patterns – QoS Enabled Web Services – QoS Enabled Applications. (8 Hours)

SELF-STUDY: (Not included for Examination)

Types of Security attacks and Threats – Pages: 323 – 325

TEXT BOOK

Sandeep Chatterjee, James Webber. (2003). *Developing Enterprise Web Services: An Architects Guide*, Prentice Hall.

UNIT	CHAPTERS	PAGE NO.
I	1,2	1 – 13,17-25
II	2,3	26 – 68,69-85
III	3,4	98 – 118 ,119-134
IV	5	145 – 164
	6	175 – 181
V	9	343 – 371

REFERENCE BOOKS

1. Keith Ballinger. (2003). *NET Web services: Architecture and Implementation with .Net*, 1st Edition, Pearson Education.

2. Ramesh Nagappan. (2003). *Developing Java Web Services: Architecting and developing secure Web Services Using Java*, 1st Edition, John Wiley and Sons.

3. Eric A Marks and Mark J Werrell. (2003). *Executive Guide to Web services*, John Wiley and sons.

4. Anne Thomas Manes. (2003). *Web Services: A managers Guide*, Addison Wesley.

WEB RESOURCES

1. https://www.tutorialspoint.com/webservices/index.htm

2. https://www.javatpoint.com/web-services-tutorial

3. https://www.btechguru.com/training--programming--xml--web-services--web-services-part-1-video-lecture--11801--24--147.html

Course Code 24PCSE31	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	3	3	3	1	1	-	2	3	2	3
CO2	3	2	2	1	1	-	2	3	2	-
CO3	3	3	3	3	2	2	3	2	1	-
CO4	3	3	3	3	2	2	2	2	1	3
CO5	3	3	3	2	2	2	3	3	1	1

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

Mrs. P. Aruna Devi   Mrs. R.Sabitha
Heads of the Department   **Course Designer**

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Semester III		Hours/Week: 3	
Elective Course - 7 NME	**PYTHON PROGRAMMING**	Credits: 2	
Course Code **24PCSN31**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: explain the features, history, and fundamental concepts of Python programming, including literals, identifiers, data types, and operators. [K1]

CO2: demonstrate the use of functions, recursion, and string manipulation techniques for efficient programming. [K2]

CO3: describe the concepts in file handling operations such as reading, writing, renaming, and deleting files. [K2]

CO4: apply decision control and looping statements to implement conditional logic and iteration in Python programs. [K3]

CO5: analyze and implement various data structures such as lists, tuples, and dictionaries for data organization and manipulation. [K4]

UNIT I

Basics of Python Programming: Features of Python - History of Python — Literal Constants - Variables and Identifiers - Data Types of Identifiers – Input operations- Comments – Indentation – Operators and Expressions.   (9 Hours)

UNIT II

Decision Control Statements: Introduction - Selection/Conditional Branching statements - Basic Loop Structures/Iterative Statements - Nested loops- The break Statement – The continue Statement – The pass Statement.   (9 Hours)

UNIT III

Functions and Modules: Introduction - Function Definition – Function Call – Variable Scope and its Lifetime – The return Statement **-** Fruitful Functions - Recursive

43

Functions: Greatest Common Divisor – The Fibonacci Series. **Python Strings Revisited:** Introduction - Concatenating, Appending and Multiplying Strings - Built-in String Methods and Functions – Comparison Strings.   (9 Hours)

UNIT IV

Data Structures: Lists: Access values in List- Updating values in Lists- Nested lists –Cloning Lists - Basic list operations - List Methods. Tuples: Creating Tuples - Accessing values in a Tuple - Updating Tuple - Deleting Elements in Tuple – Nested Tuples– Advantages of Tuples over Lists.   (9 Hours)

UNIT V

Data Structures: Dictionaries: Creating a Dictionary - Adding and Modifying an item in a Dictionary – Modifying an entry – Deleting items – Built-in Dictionary Functions and Methods - Difference between Lists and a Dictionary. **File   Handling:** Types of Files - Opening and Closing Files -Reading and Writing Files - File Positions-Renaming and Deleting files.   (9 Hours)

SELF-STUDY:

Python Strings Revisited : Slice Operation, ord() and chr() Functions, in and not in Operators (6.6-6.8)

TEXT BOOK

Reema Thareja. (2017). *Python Programming using problem solving approach*, 2nd Edition, Oxford University Press.

UNIT	CHAPTERS	SECTIONS
I	3	3.1,3.2,3.5- 3.9,3.11,3.12
II	4	4.1 – 4.7
III	5	5.1 – 5.6, 5.11(5.11.1,5.11.3)
	6	6.1,6.2,6.5,6.9
IV	8	8.2(8.2.1-8.2.5,8.2.8), 8.4(8.4.1, 8.4.3 - 8.4.5, 8.4.9, 8.4.15)
V	8	8.6(8.6.1,8.6.3-8.6.5),8.6.9,8.6.10
	7	7.3 – 7.7

REFERENCE BOOKS

1. Kenneth A. Lambert. *Fundamentals of Python – First Programs*, CENGAGE Publication.

2. VamsiKurama. *Python Programming: A Modern Approach*, Pearson Education.

3. Mark Lutz. *Learning Python*, Orielly.

Course Code 24PCSN31	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	-	-	1	-	-	-
CO2	2	2	-	-	2	-	-	1
CO3	3	2	1	-	2	2	-	1
CO4	3	3	2	2	3	2	-	-
CO5	3	3	3	2	3	2	-	2

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

Mrs. P.Aruna Devi   Mrs.S.Rajapriya

Head of the Department   **Course Designer**

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(2024-2025 onwards)

Semester III		Hours/Week: 0	
Self Study Course	**PRACTICE FOR SET/NET – GENERAL PAPER**	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   Mrs. K.Anitha
Dr. V. Navaneethamani   Dr.S. Malathi
Heads of the Departments   **Course Designers**

20th Academic Council Meeting 30.05.2025

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Semester III		Hours/Week: -	
Internship	**INTERNSHIP**	Credits: 2	
Course Code		Internal	External
24PCSI31		75	25

COURSE OUTCOMES

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

CO1: apply theoretical knowledge to solve real-world problems during the internship by developing or improving computer-based solutions using programming, database, or web technologies. [K3]

CO2: apply appropriate tools, techniques, and frameworks used in the industry to complete assigned tasks or project components. [K3]

CO3: implement software components in a real-time environment adhering to industry standards and practices. [K3]

CO4: analyze the problem domain, requirements, and constraints to design a feasible solution or contribute effectively to ongoing projects in the industry. [K4]

CO5: evaluate the effectiveness and efficiency of the implemented solution using performance metrics, user feedback, or comparative analysis. [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.

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Course code 24PCSI31	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	3	3	2	3
CO2	3	3	2	2	3	3	2	3
CO3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3

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

Mrs. P. Aruna Devi   Mrs. P.Aruna Devi
Head of the Department   **Course Designer**

20th Academic Council Meeting 30.05.2025

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Semester III		Hours/Week: -	
Extra Credit Course	**ROBOTIC PROCESS AUTOMATION**	Credits: 2	
Course Code **24PCSO31**		Internal 100	External -

COURSE OUTCOMES

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

CO1: elaborate the basis of RPA and its methodologies for development, data processing & deployment.

CO2: demonstrate the methods for RPA development, deployment and monitoring.

CO3: illustrate the data preparation and process mining of RPA.

CO4: outline the processes of RPA development, deployment and management.

CO5: analyze data preparation and process mining of RPA.

UNIT I

RPA Foundations: What is RPA? – Flavors of RPA – History of RPA – Benefits of RPA – Downsides of RPA. **RPA Skills:** On-Premise Vs. the Cloud – Web Technology – Programming Languages and Low Code – OCR(Optical Character Recognition) – Databases – APIs(Application Programming Interfaces) – AI(Artificial Intelligence) – Cognitive Automation – Agile, Scrum, Kanban and Waterfall – DevOps – Flowcharts.

UNIT II

Process Methodologies: Lean – Six Sigma – How to implement Six Sigma – Six Sigma Roles and Levels – Lean Six Sigma – Finding the Right Balance – Applying Lean and Six Sigma to RPA. **Center of Excellence:** What is the CoE? – Why have a CoE? – Forming the Team – Business Analyst – Developer – RPA Solution Architect -

RPA Supervisor - What Should a CoE Do? – Communication - Change Management - CoE Case Study: Intuit.

UNIT III

Bot Development: Getting Started - Activities - Flowcharts and Sequences - Log Message - Variables - Loops and Conditionals - For Each Loop - Do While Loop and While Loop - IF/THEN/ELSE Conditionals - Switch – Debug - Common UiPath Functions - The UiPath Orchestrator - Best Practices for Bot Development.

UNIT IV

Deployment and Monitoring: Testing - Going into Production – Monitoring – Security - Scaling. **Data Preparation:** Types of Data - Big Data - The Issues with Big Data - The Data Process - Types of Algorithms - The Perils of the Moonshot - Bias.

UNIT V

  Open Source RPA: What Is Open Source Software? - The Business Model of Open Source - The Pros and Cons of Open Source Software - OpenRPA - UI.Vision - Robot Framework - Robocorp - Orchestra - TagUI. **Process Mining:** Old Way Vs. Process Mining - Backgrounder on Process Mining - How Process Mining Works - Celonis - ProM - Signavio - Fluxicon - ABBYY - The Future of Process Mining.

TEXT BOOK

Tom Taulli. (2020). *The Robotic Process Automation Handbook*, Apress.

UNIT	CHAPTERS	PAGE No.
I	1	20-28
	2	40-57
II	3	62-75
	6	121-136
III	7	142-170
IV	8	175-182
	9	187-199
V	11	238-247
	12	252-264

REFERENCE BOOKS

1. Alok Mani Tripathi. (2018). *Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool*, Packt Publishing Limited.

2. Steve Kaelble. (2018). *Robotic Process Automation,* John Wiley & Sons, Ltd.

WEB RESOURCES

1. https://www.tutorialspoint.com/uipath/uipath_robotic_process_automation_introductio n.htm

2. https://www.javatpoint.com/rpa

3. https://onlinecourses.nptel.ac.in/noc19_me74/preview

Course Code 24PCSO31	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	3	3	2	2	2	-	2	3	2	-
CO2	3	3	2	2	2	1	2	3	2	-
CO3	3	3	3	3	2	1	2	2	1	-
CO4	3	3	3	3	2	2	2	2	1	1
CO5	3	3	3	2	2	2	2	3	1	1

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

Mrs. S. Rajapriya

Mrs. P. Aruna Devi   Ms. M. Porkalai Selvi
Head of the Department   **Course Designers**

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(2024-2025 onwards)

Semester IV		Hours/Week: 6	
Core Course 11	**DATA SCIENCE AND ANALYTICS**	Credits: 5	
Course Code **24PCSC41**		Internal 25	External 75

Course Outcomes:

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

CO1: describe various facets of data, life cycle, different attributes and data types in R, importance and application of machine learning model in Data Science. [K2]

CO2: implement the process and life cycle of data analytics to solve real world problem using concepts in R. [K3]

CO3: apply the techniques of exploratory data analytics, visualization and models for any real time dataset.[K3]

CO4: analyse the steps in data science process, tools and techniques used in data analytics, various visualization techniques in R. [K4]

CO5: formulate a data-driven strategy to solve a problem, incorporating data analysis and insights. [K4]

UNIT I

Data Science in a big data world: Benefits and uses of data science and big data – Facets of data – The data science process – The big data ecosystem and data Science – **The data science process:** Overview of the data science process – Step 1: Defining research goals and creating a project chapter – Step 2: Retrieving data – Step 3: Cleansing, integrating, and transforming data – Step 4: Exploratory data analysis – Step 5: Build the models – Step 6: Presenting findings and building applications on top of them. (18 Hours)

UNIT II

Machine Learning: What is machine learning and why should you care about it? – The modeling process – Types of machine learning – Semi-supervised learning.

53

Data Analytics life cycle: Data Analytics Lifecycle Overview - Phase 1: Discovery - Phase 2: Data Preparation - Phase 3: Model Planning - Phase 4: Model Building - Phase 5: Communicate Results - Phase 6: Operationalize.   (18 Hours)

UNIT III

Review of Basic Data Analytic Methods Using R: Introduction to R: Graphical User Interfaces – Data Import and Export – Attribute and Data Types – Descriptive Statistics – Exploratory Data Analysis: Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables – Data Exploration Versus Presentation. **Advanced Analytics-Technology and Tools: MapReduce and Hadoop**: Analytics for Unstructured Data - The Hadoop Ecosystem – NoSOL.   (18 Hours)

UNIT IV

Advanced Analytical Theory and Methods: Clustering: Overview of Clustering - K-means: Use Cases – Overview of the Method – Determining the Number of Cluster – Diagnostics – Reasons to Choose and Cautions. **Advanced Analytical Theory and Methods: Classification:** Decision Trees – Overview of a Decision Tree - The General Algorithm – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Tree in R – Naive Bayes: Bayes' Theorem – Naïve Bayes Classifier – Smoothing – Diagnostics - Naïve Bayes in R.   (18 Hours)

UNIT V

Advanced Analytical Theory and Methods: Association Rules: A priori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - An Example: Transactions in a Grocery Store. **Advanced Analytical Theory and Methods: Regression**: Linear Regression - Logistic Regression - Additional regression methods.   (18 Hours)

SELF-STUDY:

Data Analytics life cycle: Case Study: Global Innovation Network and Analysis (GINA) (Text Book 2, Section 2.8)

TEXT BOOKS

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali. (2016). *Introducing Data Science Big Data, Machine Learning, and More, Using Python Tools*, Manning Publications Co, Shelter Island, New York.

2. EMC Education Services. (2015). *Data Science and Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data*, John Wiley & Sons, Inc, India.

UNIT	TEXT BOOKS	CHAPTERS	SECTIONS
I	1	1	1.1 – 1.4
		2	2.1 – 2.7
II	1	3	3.1 – 3.4
	2	2	2.1 – 2.7
III	2	3	3.1 - 3.2
		10	10.1 – 10.3
IV	2	4	4.1, 4.2
		7	7.1, 7.2
V	2	5	5.2 – 5.5
		6	6.1, 6.2, 6.4

REFERENCE BOOKS

1. Noreen Burlingame, Lars Nielsen. (2012). *A Simple Introduction to Data Science,* New Street Communications, LLC, United States.

2. Roger D. Peng, (2016). *R Programming for Data Science,* Lean Publication, Canada.

WEB RESOURCES

1. https://www.tutorialspoint.com/python_data_science/index.htm

2. https://www.javatpoint.com/data-science

3. https://nptel.ac.in/courses/106/106/106106179/

Course Code 24PCSC41	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	2	1	2	2	1	2	2	2	-	-
CO2	3	1	2	2	1	2	2	2	-	-
CO3	3	1	3	2	1	2	2	2	-	-
CO4	3	1	3	2	2	3	3	3	-	1
CO5	3	2	3	2	2	3	3	3	-	2

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

Mrs. P. Aruna Devi

Mrs. P. Aruna Devi   Mrs. T. Chitra
Head of the Department   **Course Designers**

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Semester IV		Hours/Week: 6	
Core Course - 12 Practical IV	**WEB APPLICATION DEVELOPMENT AND HOSTING PRACTICAL**	Credits: 4	
Course Code **24PCSC41P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: understand the basic HTML tags to create static webpages [K2]

CO2: generalize the usage of appropriate tags for elegant webpage creation [K2]

CO3: construct dynamic web applications using HTML forms [K3]

CO4: apply validation and forming of webpages appropriately [K3].

CO5: ensure the elegance of the webpage created. [K4]

List of programs:

1. Develop a website for your college using advanced tags of HTML.

2. Create a Collapsible DIV using jQuery.

3. Create a hot text of country name and provide a brief introduction about that country.

4. Display Pie Chart and Bar Chart.

5. Create a form that accepts multiple input for a selection box and display the multiple selection made in that form.

6. Develop a HTML document to i) Display Text with Bullets / Numbers - Using Lists ii) to display the Table Format Data

7. Develop a Complete Web Page using Frames and Framesets to provide Information about a Hospital using HTML.

8. Design a Single page website.

9. Create a simple Search bar.

10. Write a HTML document to print your Bio-Data in a neat format.

11. Develop a HTML document to display a Registration Form for an inter-collegiate function.

12. Using HTML form accept Customer details like Name, City, Pin code, Phone number and Email address and validate the data and display appropriate messages for violations using PHP (Eg. Name is Mandatory field; Pin code must be 6 digits, etc.).

13. Design a webpage for online book store.

14. Write a program to get information of registration form and display that information.

15. Validate login page credentials and provide success or failure of that credential.

16. Create the pages for fruits and vegetables with their rates, no. of qty, write the program to calculate the subtotal & total display the selected item and subtotal & total display in separate page using cookies.

17. Create the login web page using session

18. Develop a shopping cart using cookies

Course Code 24PCSC41P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	3	3	3	2	1	2	3	3	2	2
CO2	3	3	2	2	2	-	2	2	2	2
CO3	3	2	2	2	2	1	2	2	1	2
CO4	3	2	2	2	2	2	2	3	1	1
CO5	3	2	2	2	2	1	2	3	1	1

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

Mrs. S. Rajapriya
Mrs. P. Aruna Devi   Mrs. M.Sangeetha Alias Sheeba
Head of the Department   **Course Designers**

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M.Sc. COMPUTER SCIENCE

(2024-2025 onwards)

Semester IV		Hours/Week: 6	
Project	**PROJECT**	Credits: 5	
Course Code		Internal	External
24PCSC42PR		40	60

COURSE OUTCOMES

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

CO1:   describe the problem in specified domain utilizing the disciplinary knowledge. [K2]

CO2:   investigate the methodology and solutions to the problem area. [K3]

CO3:   apply the selected methodology to the problem. [K3]

CO4:   transform the ideas to solution for the specified problem. [K4]

CO5:   validate the finding of the problem. [K5]

- 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. It should be typed neatly in MS word (12 pt, Times New Roman, 1.5 spacing)

- 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 24PCSC42PR	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	3	3	3	2	2	3	3	3	2	3
CO2	3	3	3	2	2	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

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

Mrs. P.Aruna Devi   Mrs. S.Veni

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.Sc. COMPUTER SCIENCE

(2024-2025 onwards)

Semester IV		Hours/Week: 6	
Elective Course -8 Industry	**INTERNET OF THINGS**	Credits: 3	
Course Code **24PCSE41**		Internal	External
		25	75

COURSE OUTCOMES

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

CO1: express basic design of IoT, domain specific IoT, IoT and M2M communication. [K2]

CO2: examine IoT system management, logical design of IoT using Python, IoT design methodology, physical servers and cloud offering in IoT.[K3]

CO3: use Python program for IoT system components, IoT system management protocols and domain specific IoTs. [K3]

CO4: manage IoT system, physical servers and cloud offerings. [K4]

CO5: explore domain specific applications, M2M communication, logical design and Physical devices programming in IoT. [K4]

UNIT I

Introduction to Internet of things: Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels and Deployment Templates. (18 Hours)

UNIT II

Domain Specific IoTs: Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle. **IoT and M2M**: Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT.

(18 Hours)

UNIT III

IoT System Management with NETCONF-YANG: Need for IoT Systems Management-Simple Network Management Protocol (SNMP) – Network Operator Requirements– NETCONF – YANG – IoT Systems Management with NETCONF-YANG. **IoT Platforms Design Methodology:** Introduction –IoT Design Methodology – Case Study on IoT System for Weather Monitoring – Motivation for Using Python.

(18 Hours)

UNIT IV

IoT Systems - Logical Design Using Python : Introduction – Python Data Types and Data Structures – Control Flow – Functions – Modules – Packages – File Handling – Date/Time Operations – Classes –Python Packages of Interest for IoT**. IoT Physical Devices & End Points:** What is an IoT Device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry pi – Raspberry pi Interfaces – Programming Raspberry pi with Python.

(18 Hours)

UNIT V
IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models& Communication API's – WAMP – Auto Bahn for IoT – Xively cloud For IoT – Python Web Application Framework – Django– Designing a REST ful Web API – Amazon Web Services for IoT –Sky Net IoT Messaging Platform.

(18 Hours)

SELF STUDY
Data Analytics for IoT (Page No: 335 – 347)
TEXT BOOK
Arshdeep VijayMadisetti. (2009). *Internet of Things A Hands-ON Approach,* 1st Edition, Universities Press Private Limited.

UNIT	CHAPTER	PAGE NUMBERS
I	1	1.1 - 1.5
II	2	2.1 - 2.10
	3	3.1 - 3.4
III	4	4.1 - 4.6
	5	5.1 - 5.4
IV	6	6.1, 6.3 - 6.11
	7	7.1 - 7.6
V	8	8.1 - 8.7

REFERENCE BOOKS

1. Francis DaCosta. (2013). *Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*, 1st Edition, Apress Publications.

2. Cuno P Fister. (2011). *Getting Started with Internet Of Things*, 1st Edition, ORELLY.

3. Boris Adryan, DominikObermaier and Paul Fremantle. (2017). *The Technical Foundations of IoT*, Artech House Publishers.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc20_cs66/preview

2. https://www.javatpoint.com/iot-internet-of-things

3. https://www.tutorialspoint.com/internet_of_things/index.htm

Course Code 24PCSE41	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	1	-	2	-	-	1	-	-	-	-
CO2	1	1	2	-	-	2	-	-	-	-
CO3	1	1	3	1	-	2	1	1	-	-
CO4	2	1	1	1	1	1	2	2	-	2
CO5	2	2	1	1	1	2	2	3	-	2

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

Mrs. P.Aruna Devi   Mrs.V.Subhasini
Head of the Department   **Course Designer**

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

M.Sc. COMPUTER SCIENCE

(2024-2025 onwards)

Semester IV		Hours/Week: 6	
Professional Competency Skill	**COMPUTER SCIENCE FOR COMPETITIVE EXAMINATIONS**	Credits: 3	
Course Code		Internal	External
24PCSS41		25	75

COURSE OUTCOMES

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

CO1: describe fundamental concepts, analysis of algorithms and database management in computer science for competitive examination. [K1]

CO2: elaborate a complex computing problem, its principles of computing that helps to identify solutions. [K2]

CO3: distinguish different computing languages and apply data structures and algorithm design techniques. [K2]

CO4: acquire formal reasoning about languages, network protocols, management system in operating system and analysis of algorithm. [K3]

CO5: analyze the types of computing languages, functions of network algorithms, performance of computer system. [K4]

UNIT I

      Programming Languages and Computer Graphics: Programming in C – Object Oriented Programming – Programming in C++ – Web Programming – Computer Graphics – 2-D Geometrical Transforms and Viewing.   (18 Hours)

UNIT II

      Database Management Systems: Database System Concepts and Architecture – Data Modeling – SQL – Normalization for Relational Databases – Data Warehousing and Data Mining.   (18 Hours)

UNIT III

   System Software and Operating Systems: System Software – Process Management – Threads – CPU Scheduling – Deadlocks – Memory Management – Storage Management.   (18 Hours)

UNIT IV

   Data Structures and Algorithms: Data Structures – Design Techniques – Graph Algorithms – Complexity Theory.   (18 Hours)

UNIT V

   Data Communication and Computer Networks: Data Communication – Computer Networks – Network Model – Functions of OSI and TCP/IP Layers – World Wide Web (WWW).   (18 Hours)

SELF STUDY
   Programming Languages and Computer Graphics: 3-D Object Representation, Geometric Transformation and Viewing.

TEXT BOOK

   Sanjay Singhal and Sameer Mishra**.** (2020). *NTA UGC NET/SET Computer Science and Applications,* Danika Publishing Company.

REFERENCE BOOKS

1. Surabhi Mitra. (2022). *Handbook Computer Science & IT for GATE, IES, PSU and Other Competitive Exams*, 2nd Edition, Arihant Publications.
2. Kailash Chandra Gururani Surabhi Sharma. (2023). NTA UGC NET/ JRF/ SET Paper 2 Computer Science & Applications, Seventh Edition, Arihant Publications.
3. Sanjay Singhal and Sameer Mishra. (2023). NTA UGC NET Computer Science and Applications, Invincible Publisher & Marketeers.

Course Code 24PCSS41	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	2	-	3	1	2	-	2	1	-	-
CO2	2	1	2	1	-	1	2	1	-	-
CO3	2	2	3	-	1	2	3	2	-	3
CO4	2	2	3	2	2	3	2	3	-	-
CO5	2	3	3	3	2	3	1	3	-	-

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

Mrs. V. Subhasini
Mrs. P. Aruna Devi   Ms. M. Porkalai Selvi
Head of the Department   **Course Designers**