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 – UG

1. Core Courses
2. Elective Courses

   - Generic Elective Courses
   - Discipline Specific Elective Courses (DSEC)
   - Non Major Elective Courses (NMEC)

3. Skill Enhancement Courses (SEC)
4. Environmental Studies (EVS)
5. Value Education
6. Self-Study Courses (Online)
7. Extra Credit Courses (Self Study Courses) (Optional)

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

UG PROGRAMMES

Name of the Course	Course Code	Semester	Department	
			Offered by	**Offered for**
Introduction to Tourism	24UHIN11	I	History (E.M)	Students other than B.A. History Discipline
Indian Constitution	24UHIN21	II		
சுற்றுலா ஓர் அறிமுகம்	24UHIN11	I	History (T.M)	
இந்திய அரசியலமைப்பு	24UHIN21	II		
Popular Literature and Culture	24UENN11	I	English	Students other than B.A. English
Philosophy for Literature	24UENN21	II		
அடிப்படைத் தமிழ் இலக்கணம் – I எழுத்தறிதல்	24UBTN11	I	Tamil	students who have chosen Part I Hindi
அடிப்படைத்தமிழ் –II மொழித் திறனறிதல்	24UBTN21	II		
பேச்சுக்கலைத்திறன்	24UTAN11	I	Tamil	Students other than B.A. Tamil
பயன்முறைத் தமிழ்	24UTAN21	II		

Basic Hindi - I	24UBHN11	I	Hindi	All Discipline students
Basic Hindi - II	24UBHN21	II		
Everyday Banking/ Practical Banking	24UCON11N/ 24UCON11	I	Commerce (Aided)	Students other than Commerce Discipline
Basic Accounting Principles	24UCON21	II		
Everyday Banking	24UCON11N	I	Commerce (Self)	
Emotional Intelligence	24UCON21N	II		
Everyday Banking/Self- Employment and Startup Business	24UCON11N/ 24UCCN11	I	Commerce C.A.(Self)	
Fundamentals of Marketing	24UCCN21	II		
Everyday Banking/ Practical Banking	24UCPN11N/ 24UCPN12N	I	Commerce Professional Accounting	
Basic Accounting Principles	24UCPN21N	II		
Basics of Event Management	24UBAN11	I	Business Administration	Students other than B.B.A. Discipline
Managerial Skill Development	24UBAN21	II		
Quantitative Aptitude -I	24UMTN11	I	Mathematics	Students other than B.Sc. Mathematics Discipline
Quantitative Aptitude – II	24UMTN21	II		
Physics for EveryDay Life	24UPHN11	I	Physics	Students other than B.Sc. Physics Discipline
Astrophysics	24UPHN21	II		
Food Chemistry	24UCHN11	I	Chemistry	Students other than B.Sc. Chemistry Discipline
Dairy Chemistry	24UCHN21	II		
Ornamental fish farming and Management	24UZYN11	I	Zoology	Students other than B.Sc. Zoology Discipline
Biocomposting for Entrepreneurship	24UZYN21	II		
Foundations of Baking and Confectionery	24UHSN11	I	Home Science – Nutrition and Dietetics	Students other than B.Sc. Home Science – Nutrition and Dietetics Discipline
Women's Health and Wellness	24UHSN21	II		
Nutrition and Health	24UBCN11	I	Biochemistry	Students other than B.Sc. Biochemistry Discipline
Life Style Diseases	24UBCN21	II		
Social and Preventive Medicine	24UMBN11	I	Microbiology	Students other than B.Sc. Microbiology Discipline
Nutrition and Health Hygiene	24UMBN21	II		

Herbal Medicine	24UBON11	I	Biotechnology	Students other than B.Sc. Biotechnology Discipline
Organic Farming and Health Management	24UBON21	II		
Basics of Fashion	24UCFN11	I	Costume Design And Fashion	Students other than B.Sc. Costume Design And Fashion
Interior Designing	24UCFN21	II		
Introduction to HTML	24UCSN11N	I	Computer Science	Students other than Computer Science Discipline
Office Automation	24UCSN21N	II		
Basics of Internet	24UITN11N	I	Information Technology	
Data Analysis using Spreadsheet	24UITN21N	II		
Fundamentals of Information Technology	24UDSN11	I	Data Science	
Computer Fundamentals	24UDSN21	II		
Web Designing	24UCAN11N	I	B.C.A.	
Fundamentals of Computers	24UCAN21N	II		
Organic Farming	24UBYN11	I	Botany	All Discipline students
Nursery and Landscaping	24UBYN12	I		
Mushroom Cultivation	24UBYN21	II	Botany	
Medicinal Botany	24UBYN22	II		
Library and Information Science - I	24ULSN11	I	Library Science	All Discipline students
Library and Information Science - II	24ULSN21	II		
Cadet Corps for Career Development I	24UNCN11	I	National Cadet Corps	students who have chosen NCC as Part V course
Cadet Corps for Career Development II	24UNCN21	II		

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 channelize their teaching methodologies and evaluation strategies to attain the 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 enrich the students to be technologically skilled, ethical responsibilities, technical and professional values and face the challenges of the ever changing world.

Mission of the Department of Computer Applications

- To impart the fundamental principles of computer science, and continue to develop their technical competencies.
- To train students for careers as socially responsible IT professionals, entrepreneurs and researchers
- To empower the student in rural communities with effective communication skills and high ethical values.

Programme Educational Objectives (PEOs)

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

Programme Educational Objectives (PEOs) of B.C.A. Programme

The students will be able to

PEO1: Effectively utilizing their knowledge of computing principles and mathematical theory to develop sustainable solutions to current and future computing problems.

PEO2: employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur.

PEO3: Shine as socially committed computer professionals having mutual respect, efficient programming skills and satisfy the needs of society.

Key Components of Mission Statement	Programme Educational Objectives		
	PEO1	**PEO2**	**PEO3**
continues development of technical competency	√	√	
train students for careers as IT professionals	√	√	
empower the student in rural communities	√		√

B.1.2 Programme Outcomes (POs)

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

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

1 apply effectively the acquired knowledge and skill in the field of Arts, Physical Science, Life Science, Computer Science, Commerce and Management for higher studies and employment. (*Disciplinary Knowledge*)

2 articulate innovative thoughts and ideas proficiently in both in spoken and written forms. (*Communication Skills*)

3 identify, formulate and solve problems in real life situations scientifically / systematically by adapting updated skills in using modern tools and techniques. (*Scientific Reasoning and Problem Solving*)

4 critically analyse, synthesize and evaluate data, theories and ideas to provide valid suggestions through assignments, case studies, Internship and projects for the fullfillment of the local, national and global developmental needs. (*Critical Thinking and Analytical Reasoning*)

5   use ICT in a variety of self-directed lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning)*

6   self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence)*

7   uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness)*

B.1.3 Programme Specific Outcomes (PSOs)

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

On completion of B.C.A. Programme, the students will be able to

PO1 - *Disciplinary Knowledge*

PSO 1.a: Apply the acquired knowledge in Computer Science and in interdisciplinary fields for successful career and higher studies.

PSO1.b: Make use of the technical knowledge in various technology field of computer science to identify the problem, analyze, design and develop the system as the solution to the problem.

PO2 – *Communication Skills*

PSO2: ability to express the computer knowledge by preparing documentation and communicate to the society with effective presentation.

PO3 – *Scientific Reasoning and Problem Solving*

PSO3.a: Apply theoretical foundations of computer applications with emphasis on strong practical training that enable them to solve real world problems related to sustainable environment.

PSO3.b: Analyze needed information and/or eliminate extraneous information towards solving contextual problems.

PO4 – *Critical Thinking and Analytical Reasoning*

PSO 4.a: Analyze, sketch and attain the innovative solutions to the problems related to Computer Industry.

PSO 4.b: Critically evaluate the software systems and find the optimum solution through research for the betterment of society.

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

PSO5: Utilize modern computing tools, skills and techniques necessary for facing issues in finding software solutions in their career.

PO6 –*Co-operation/Team Work and Multi-Cultural Competence*

    PSO6: Apply their leadership qualities, and cooperative spirit to achieve the project targets.

PO7 –*Moral and Ethical Awareness*

    PSO 7: Solve and work with a professional context pertaining to ethics, cultural and cyber regulations

PO-PEO Mapping Matrix

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

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

B.1.4 Course Outcomes (COs)

Course Outcomes are narrow statements restricted to the Course contents given in five units. Course Outcomes describe what students would be capable of, after learning the contents of the Course. They reflect the level of knowledge gained, skills acquired and attributes developed by the students after learning of Course contents. COs are measurable, attainable and manageable in number. COs contribute to attain POs in such a way that each CO addresses at least one of the POs and also each PO is reasonably addressed by adequate number of COs.
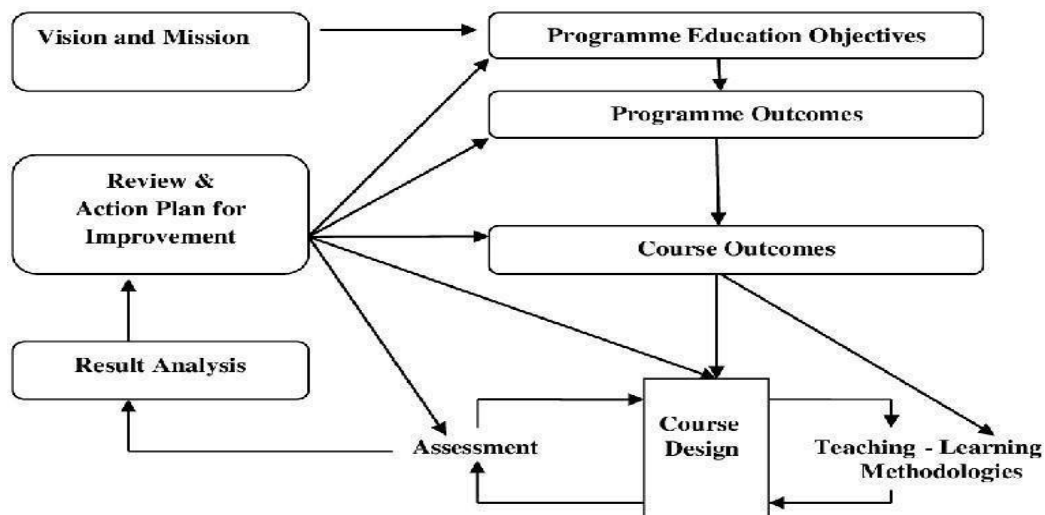
It is important to determine the methods of assessment. A comprehensive assessment strategy may be outlined using the revised Bloom's Taxonomy levels.

BLOOM'S TAXONOMY
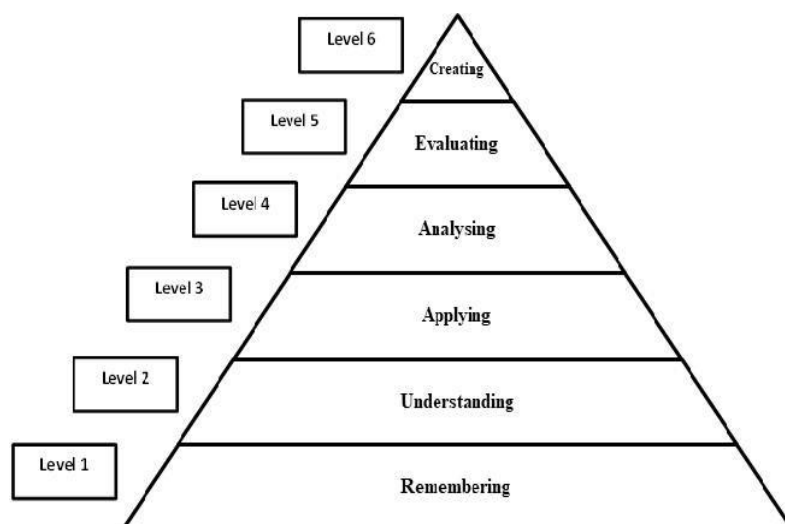
CO – PO Mapping of Courses

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

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

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

ELIGIBILITY FOR ADMISSION

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

DURATION OF THE PROGRAMME

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

MEDIUM OF INSTRUCTION

English

COURSES OFFERED

Part I	:	Tamil/Hindi Course
Part II	:	English
Part III	:	Core Courses
		Elective Courses • Generic Elective Courses • Discipline Specific Elective Courses
		Self-Study Course - online
Part IV	:	Skill Enhancement Courses (SEC)
		Elective Course (NMEC)
		Environmental Studies Value Education
		Internship/Industrial Training
		Self-Study Course – online
Part V	:	National Service Scheme/ Physical Education/ Youth Red Cross Society/ Red Ribbon Club/ Science Forum/ Eco Club/ Library and Information Science/ Consumer Club/ Health and Fitness Club/ National Cadet Corps/ Rotaract Club

B.2 EVALUATION SCHEME

B.2.1.PART II

Components	Internal Assessment Marks	Summative Examination Marks	Total Marks
Theory	15	60	100
Practical	5	15	
Assignment	5	-	

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

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B.2.2.Part I & PART III - Core Courses, Elective   Courses (Generic, DSEC)

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

INTERNAL ASSESSMENT

Distribution of Marks

Theory

Mode of Evaluation			Marks
Periodic Test		:	15
Assignment	K3 Level	:	5
Quiz	K1 Level	:	5
Total		:	**25**

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

Two Assignments   - Better of the two will be considered

Three Quiz Tests   - Best of the three will be considered

Practical

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

*Average of the two practical tests will be considered

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

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

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

SUMMATIVE EXAMINATION

Question Pattern   **Duration: 3 Hours**

Section	Q. No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 -10	Multiple Choice	10	10	1	10
B	11 - 15	Internal Choice – Either …or Type	5	5	7	35
C	16 - 18	Internal Choice – Either… or Type	3	3	10	30
					Total	**75**

PROJECT

Assessment by Internal Examiner Only

Internal Assessment

Distribution of Marks

Mode of Evaluation	:	Marks
Project work and Report	:	60
Presentation and Viva –Voce	:	40
Total	:	100

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

B.2.3.1 FOUNDATATION COURSE

INTERNAL ASSESSMENT
Distribution of Marks
Theory

Mode of Evaluation			Marks
Periodic Test		:	15
Assignment	K2 Level	:	5
Quiz	K1 Level	:	5
Total		**:**	**25**

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

Two Assignments   - Better of the two will be considered

Three Quiz Tests   - Best of the three will be considered

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

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

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

SUMMATIVE EXAMINATION

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

Question Pattern   **Duration: 2 Hours**

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

B.2.3.2 Skill Enhancement Course - Entrepreneurial skills

INTERNAL ASSESSMENT ONLY
Distribution of Marks

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment	:	5
Quiz	:	5
Model Examinations	:	60
Online Quiz (Multiple Choice Questions - K2 Level)	:	15
Total	**:**	**100**

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

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

[*]The total marks obtained in the Periodic Test will be calculated for 15 marks

Two Periodic Tests - Better of the two will be considered

Two Assignments   - Better of the two will be considered

Two Quiz Tests   - Better of the two will be considered

Question Pattern for Model Examination   **Duration: 2 Hours**

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	6	30
B Q. No.(6- 8)	Internal Choice – Either Or Type	3	3	10	30
Total					**60**

B.2.3.3 Skill Enhancement Courses/ Non Major Elective Courses

INTERNAL ASSESSMENT

Distribution of Marks

Theory

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

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

Two Assignments   - Better of the two will be considered

Three Quiz Tests   - Best of the three will be considered

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

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

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

SUMMATIVE EXAMINATION

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

Question Pattern   **Duration: 2 Hours**

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

B.2.4 PART IV- ENVIRONMENTAL STUDIES / VALUE EDUCATION
INTERNAL ASSESSMENT ONLY
Evaluation Pattern

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment - K3 Level	:	10
Online Quiz (Multiple Choice Questions - K2 Level)	:	25
Poster Presentation - K3 Level		10
Report - K3 Level		10
Model Examination	:	30
Total	**:**	**100**

Three Assignment   - Best of the three will be considered

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

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 3)	Internal Choice – Either Or Type	3	3	6	18
B Q. No.(4)	Internal Choice – Either Or Type	1	1	12	12
Total					**30**

Two Periodic tests   - Better of the two will be considered

[*]The total marks obtained in the Periodic Test will be calculated for 15 marks

Question Pattern for Model Examination   **Duration: 2 ½ Hours**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either … or Type	5	5	6	30
B	6 - 8	Internal Choice – Either… or Type	3	3	10	30
	Total					**60***

*The total marks obtained in the Model Examination will be calculated for 30 marks

B. 2. 5 PART IV- 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 under the guidance of an identified mentor for a period of 15 days.

- **Industrial Training:** Student has to undertake in-plant training in industries individually or in group for a period of 15 days.

- Internship / Industrial Training must be done during the fourth semester holidays

- **Internal Assessment only.**

Mode of Evaluation		Marks
Onsite Learning/Survey	:	50
Report	:	25
Viva-Voce	:	25
Total		**100**

B.2.5 SELF STUDY COURSE

B.2.5.1 PART III – Discipline Specific Quiz – Online

Assessment by Internal Examiner only

- Question Bank is prepared by the Faculty Members of the Departments for all the Core and Elective Courses offered in all the Semesters.

- No. of Questions to be taken 700.

- Multiple Choice Question pattern is followed.

- Online Test will be conducted in VI Semester for 100 Marks.

- Model Examination is conducted after two periodic tests.

Distribution of Marks

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

Two Periodic Tests   - Better of the two will be considered

B.2.5.2 PART IV - Practice for Competitive Examinations – Online

Assessment by Internal Examiner only

- Question Bank prepared by the Faculty Members of the respective Departments will be followed.

- Multiple Choice Question pattern is followed.

- Online Test will be conducted in V Semester for 100 Marks.

- Model Examination is conducted after two periodic tests.

Subject wise Allotment of Marks

Subject		Marks
Tamil	:	10
English	:	10
History	:	10
Mathematics	:	10
Current affairs	:	10
Commerce, Law & Economics	:	10
Physical Sciences	:	10
Life Sciences	:	15
Computer Science	:	5
Food and Nutrition	:	5
Sports and Games	:	5
Total	**:**	**100**

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. Part V – Extension Activities

INTERNAL ASSESSMENT ONLY

Distribution of Marks

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

*The marks obtained will be calculated for 100 marks

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 V Semesters of the Programme.

➢ The allotment of credits is as follows **(Maximum of 10 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 prescribed Courses of study, lab work, *etc.,* and a minimum Pass marks in all the Courses.

- No Pass minimum for Internal Assessment.

- Pass minimum for External Examination is 27 marks out of 75 marks for Core Courses, Elective Courses (Generic Elective, DSEC Courses)

- Pass minimum for External Examination is 18 marks out of 50 marks for Skill Enhancement Courses and Non Major Elective Courses (NMEC).

- The aggregate minimum pass percentage is 40 marks for all Courses.

- Pass minimum for External Practical Examination is 21 marks out of 60 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 60-75 days (66% - 84%) of attendance are permitted to appear for the Summative Examinations after paying the required fine amount and fulfilling other conditions according to the respective cases.

- The students who have attended the classes for 59 days and less - up to 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 Part V in UG Programmes, the students require 75 % of attendance to get a credit.

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

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

Programme Articulation Matrix (PAM)

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

Indirect Attainment of POs for all Courses

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

Attainments of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Direct Attainment							
Indirect Attainment							
Overall PO Attainment							

Overall PO Attainment= 75% of Direct PO Attainment +

25% of Indirect PO Attainment (Graduate Exit Survey

& Participation in Co- curricular and

Extra curricular Activities)

Expected Level of Attainment for each of the Programme Outcomes

POs	Level of Attainment
Attainment Value $\geq 70\%$	Excellent
$60\% \leq$ Attainment Value $< 70\%$	Very Good
$50\% \leq$ Attainment Value $< 60\%$	Good
$40\% \leq$ Attainment Value $< 50\%$	Satisfactory
Attainment Value $<40\%$	Not Satisfactory

Level of PO Attainment

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

B.3.3 Assessment Process for PEOs

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

Target for PEO Attainment

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

Attainment of PEOs

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

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

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

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

Expected Level of Attainment for each of the Programme Educational Objectives

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

Level of PEO Attainment

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

C. PROCESS OF REDEFINING THE PROGRMME EDUCATIONALOBJECTIVES

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 analyzed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like Board of Studies, Academic Council and Governing Body may recommend appropriate actions. As per the Outcome Based Education Framework implemented from the Academic Year 2020 -2021, the following are the Programme Structure, the Programme Contents and the Course Contents of B.C.A. Programme.

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

BACHELOR OF COMPUTER APPLICATIONS (UG) (3026)
Outcome Based Education with Choice Based 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	V	VI	
Part I : Tamil /Hindi	6 (3)	6 (3)	6 (3)	6 (3)	-	-	24 (12)
Part II : English	6 (3)	6(3)	6 (3)	6 (3)	-	-	24 (12)
Part III : Core Courses, Elective Courses and Self-Study Course							
Core Course	5 (5)	5 (5)	5 (5)	5 (5)	6 (6)	6 (5)	32 (31)
Core Course	-	-	-	-	6 (6)	6 (5)	12 (11)
Core Course	-	-	-	-	5 (3)		5 (3)
Core Course Practical	5(3)	5 (3)	5(3)	4 (3)	-	6 (3)	25(15)
Core Course Project	-	-	-	-	1 (1)	-	1 (1)
Elective Course (DSEC)	-	-	-	-	5(4)	5 (4)	10 (8)
Elective Course (DSEC Practical)	-	-	-	-	5(3)	5 (3)	10(6)
Elective Course I (Allied)	4 (4)	4 (4)	4 (4)	4 (4)	-	-	16(16)
Elective Course I Practical I(Allied)	-	-	-	-	-	-	-
Elective Course II(Allied)	-	-			-	-	-
Elective Course II Practical II(Allied)	-	-			-	-	-
Self-Study Course	-	-	-	-	-	0 (1)	0 (1)
Part IV : Skill Enhancement Courses, Elective Courses, Environmental Studies, Value Education, Self-Study Course							
SEC	2 (2)	-	1 (1)	2 (2)	-	-	5(5)
SEC	-	2 (2)	2 (2)	2 (2)	-	2 (2)	8 (8)
Elective Course(NME)	2 (2)	2 (2)	-	-	-	-	4 (4)
Value Education	-	-	-	-	2 (2)	-	2 (2)
Environmental Studies	-	-	1 (0)	1(2)	-	-	2 (2)
Self-Study Course	-	-	-	-	0 (1)	-	0 (1)
Internship/ Industrial Training	-	-	-	-	0 (1)	-	0 (1)
Part V : Extension Activities	-	-	-		-	0 (1)	0 (1)
Total	**30 (22)**	**30 (22)**	**30(21)**	**30 (24)**	**30 (27)**	**30(24)**	**180 (140)**
Extra Credit Course (Self-Study Course)	**-**	**-**	**-**	**-**	0(2)	**-**	0(2)

DSEC: Discipline Specific Elective Course   SEC: Skill Enhancement Course
NMEC: Non Major Elective Course

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BACHELOR OF COMPUTER APPLICATIONS
Programme Code – 3026
PROGRAMME CONTENT
SEMESTER I

S.No.	Components		Title ofthe Course	Course Code	Hours per week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1	**Part I**		Tamil / Hindi	24UTAG11/ 24UHDG11	6	3	3	25	75	100
2	**Part II**		English	24UENG11	6	3	3	25	75	100
3	**Part III**	Core Course-1	Python Programming	24UCAC11	5	5	3	25	75	100
4		Core Course -2 Practical 1	Python Programming Practical	24UCAC11P	5	3	3	40	60	100
5		Elective Course	Discrete Mathematics - I	24UCAA11	4	4	3	25	75	100
6	**Part IV**	Elective Course-NME- 1	Web Designing	24UCAN11N	2	2	3	25	75	100
7		SEC -1	Programming in C	24UCAF11	2	2	3	25	75	100
Total					**30**	**22**				**700**

BACHELOR 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	**Part I**		Tamil /Hindi	24UTAG21/ 24UHDG21	6	3	3	25	75	100
2	**Part II**		English	24UENG21	6	3	3	25	75	100
3	**Part III**	Core Course -3	Object Oriented Programming Concepts using C++	24UCAC21	5	5	3	25	75	100
4		Core Course - 4 Practical II	C++ Programming Practical	24UCAC21P	5	3	3	40	60	100
5		Elective Course	Resource Management Techniques	24UCAA21	4	4	3	25	75	100
6	**Part IV**	Elective Course-NME -2	Fundamentals of Computers	24UCAN21N	2	2	3	25	75	100
7		SEC -2	Introduction to HTML	24UCAS21N	2	2	3	25	75	100
			Total		**30**	**22**				**700**

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BACHELOR OF COMPUTER APPLICATIONS

Programme Code – 3026

PROGRAMME CONTENT

SEMESTER III

S.No.	Components		Title of the Course	Course Code	Hours per week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1	**Part I**		Tami / Hindi	24UTAG31/ 24UHDG31	6	3	3	25	75	100
2	**Part II**		English	24UENG31	6	3	3	25	75	100
3	**Part III**	Core Course - 5	Data Structures and Algorithms	24UCAC31	5	5	3	25	75	100
4		Core Course - 6 Practical- 3	Data Structures and Algorithms using C++ Practical	24UCAC31P	5	3	3	40	60	100
5		Elective Course	Numerical Methods	24UCAA31	4	4	3	25	75	100
6	**Part IV**	SEC -3	Quantitative Aptitude	24UCAS31	1	1	2	100	-	100
7		SEC - 4	Problem Solving Techniques	24UCAS32	2	2	2	25	75	100
8			Environmental Studies	24UGES41	1	0	-	-	-	-
	Total				30	21				700

BACHELOR 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	**Part I**		Tamil / Hindi	24UTAG41/ 24UHDG41	6	3	3	25	75	100
2	**Part II**		English	24UENG41	6	3	3	25	75	100
3	**Part III**	Core Course - 7	Programming in Java	24UCAC41	5	5	3	25	75	100
4		Core Course – 8 Practical 4	Programming in Java Practical	24UCAC41P	4	3	3	40	60	100
5		Elective Course	Digital Logic Fundamentals	24UCAA41	4	4	3	25	75	100
6	**Part IV**	SEC - 5	Software Project Management	24UCAS41	2	2	3	25	75	100
7		SEC - 6	PHP Programming	24UCAS42	2	2	3	25	75	100
8			Environmental Studies	24UGES41	1	2	-	100	-	100
Total					30	24				800

BACHELOR OF COMPUTER APPLICATIONS

SEMESTER V

S. No	Components		Title of the Course	Course Code	Hours per week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1		Core Course-9	Operating Systems	24UCAC51	6	6	3	25	75	100
2		Core Course - 10	ASP. Net Programming	24UCAC52	6	6	3	25	75	100
3		Core Course-11 Practical - 5	ASP. Net Programming Practical	24UCAC51P	5	3	3	40	60	100
4		Core Course- 12 Project	Project	24UCAC53PR	1	1	-	100	-	100
5	Part III	Elective Course DSEC - 1	RDBMS with PL/SQL	24UCAE51	5	4	3	25	75	100
			Image Processing	24UCAE52						
6		Elective Course DSEC Practical-2	PL/SQL Practical	24UCAE53P	5	3	3	40	60	100
			Image Processing Practical	24UCAE54P						
7	Part IV		Value Education	24UGVE51	2	2	2	100	-	100
8		Self-Study Course	Practice for Competitive Examinations - Online	24UGCE51	-	1	-	100	-	100
9		Internship/ Industrial Training	Internship	24UCAI51	-	1	-	100	-	100
				Total	**30**	**27**				**900**

| 10 | Extra Credit (Self-Study Course) | Data Mining | 24UCAO51 | - | 2 | 3 | 100 | - | 100 |

BACHELOR OF COMPUTER APPLICATIONS

SEMESTER VI

S. No.	Components		Title of the Course	Course Code	Hours per week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1	Part III	Core Course - 13	Computer Networks	24UCAC61	6	5	3	25	75	100
2		Core Course – 14	Data Analytics using R Programming	24UCAC62	6	5	3	25	75	100
3		Core Course – 15 Practical - 6	R Programming Practical	24UCAC61P	6	3	3	40	60	100
4		Elective Course DSEC – 3	Mobile Application Development	24UCAE61	5	4	3	25	75	100
			Software Testing	24UCAE62						
5		Elective Course DSEC Practical - 4	Mobile Application Development Practical	24UCAE63P	5	3	3	40	60	100
			Software Testing Practical	24UCAE64P						
6		Self-Study Course	Discipline Specific Quiz –Online	24UCAQ61	-	1	-	100	-	100
7	Part IV	SEC -7	Biometrics	24UCAS61	2	2	2	25	75	100
8	Part V		Extension Activities		-	1	-	-	-	100
				Total	30	24				800

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(2024-2025 onwards)

Semester I		Hours/Week: 5	
Core Course - 1	**PYTHON PROGRAMMING**	Credits: 5	
Course Code		Internal	External
24UCAC11		25	75

COURSE OUTCOMES

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

CO1 : outline the basics of Python, control statements, functions, strings, Python Data structures and files. [K1]

CO2 : paraphrase about Python basics, conditional, looping statements and functions. [K2]

CO3 : relate the concepts of strings, modules, List, tuples and dictionary, reading, writing and other file handling operations. [K2]

CO4 : apply Python basics, selection, looping statements, functions and Modules. [K3]

CO5 : make use of Python data structures like List, Tuple, Set, Dictionary and files concepts.[K3]

UNIT I

Basics of Python Programming: Features of Python – History of Python – The Future of Python – Literal Constants – Variables and Identifiers – Data Types – Input Operation – Comments – Reserved Words – Indentation – Operators and Expressions – Expressions in Python – Operations on Strings – Other Data Types – Type Conversion.   (15 Hours)

UNIT II

Decision Control Statements: Introduction to Decision Control Statements – Selection/Conditional Branching statements – Basic Loop Structures/Iterative Statements – Nested Loops – The break Statement – The continue Statement – The pass Statement – The else Statement used with Loops.   (15 Hours)

UNIT III

Functions and Modules: Introduction – Function Declaration and Definition – FunctionCall – Variable Scope and its Lifetime – The return Statement – More on Defining Functions – Lambda Functions or Anonymous Functions – Documentation Strings – Good

Programming Practices – Recursive Functions – Modules – Packages in Python – Standard Library modules – Globals(), Locals() and Reload() – Function Redefinition.   (15 Hours)

UNIT IV

Python Strings Revisited: Concatenating, Appending and Multiplying Strings – Strings are Immutable – String Formatting Operator – Built-in String Methods and Functions – Slice Operation
– ord() and chr() Functions – in and not in operators – Comparing Strings – Iterating String – The String Module. **File Handling:** File Path – Types of files in Python - Opening and Closing files – Reading and Writing files – File Positions – Renaming and deleting files – Directory Methods.
(15 Hours)

UNIT V

Data Structures: Lists: Creating a list – Access values in List – Updating values in Lists – Nested lists – Basic list operations – List Methods. **Tuples:** Creating Tuple – Utility of Tuples – Accessing values in a Tuple – Deleting Elements in Tuple – Basic Tuple Operations – Tuple Assignment – Tuples for Returning Multiple values – Nested Tuples – Sets – **Dictionaries:** Creating a Dictionary – Accessing values – Adding and Modifying an Item in a Dictionary – Modifying an Entry – Deleting Items – Sorting Items in a Dictionary – Looping over a Dictionary – Nested Dictionaries – Built-in Dictionary Functions and Methods – Difference between a List and a Dictionary – String Formatting with Dictionaries – List vs Tuple vs Dictionary vs Set.
(15 Hours)

TEXT BOOK

ReemaThareja.”Python Programming using problem solving approach”, First Edition 2017, Oxford University Press.

Unit	Chapter	Section
I	3	3.1 – 3.16
II	4	4.1 – 4.8
III	5	5.1 – 5.15
IV	6, 7	6.1 – 6.10, 7.1 – 7.8
V	8	8.2.1 – 8.2.6, 8.4.1 – 8.3.9, 8.5, 8.6

REFERENCE BOOKS

1. VamsiKurama, “Python Programming: A Modern Approach”, Pearson Education.
2. Mark Lutz, ”Learning Python”, Orielly.Adam Stewarts, “Python Programming”, Online.

3. Fabio Nelli, "Python Data Analytics", APress.

4. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.

WEB RESOURCES

1. https://www.guru99.com/python-tutorials.html

2. https://www.w3schools.com/python/python_intro.asp

3. https://www.geeksforgeeks.org/python-programming-language/

4. https://en.wikipedia.org/wiki/Python_(programming_language)

5. https://www.programiz.com/python-programming

Course Code 24UCAC11	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	3	2	2	-	-	1	1	-
CO2	3	3	3	3	3	1	1	2	1	-
CO3	3	3	3	2	2	2	2	2	1	-
CO4	3	3	3	3	3	2	2	2	1	1
CO5	3	3	3	3	3	2	2	3	1	1

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

Mrs. J. Porkodi   Mrs. R. Nancy Beaulah
Head of the Department   **Course Designer**

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B.C.A.

(2024-2025 onwards)

Semester I		Hours/Week: 5	
Core Course – 2 Practical 1	**PYTHON PROGRAMMING PRACTICAL**	Credits: 3	
Course Code **24UCAC11P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1   :   outline the basic concepts of needed for the given problem. [K2]

CO2   :   write programs using selection/looping statements, functions, strings, files and Python Data Structures. [K2]

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

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

CO5   :   apply the necessary modifications and justify the desired result. [K3]

List of Programs

1. Program using variables, constants, I/O statements in Python.

2. Program using Operators in Python.

3. Program using Conditional Statements.

4. Program using Loops.

5. Program using Jump Statements.

6. Program using Functions.

7. Program using Recursion.

8. Program using Arrays.

19th Academic Council Meeting 14.08.2024

9. Program using Strings.

10. Program using Modules.

11. Program using Lists.

12. Program using Tuples.

13. Program using Dictionaries.

14. Program for File Handling.

Course Code 24UCAC11P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	3	2	2	-	-	1	2	-
CO2	3	3	3	3	3	1	1	2	2	-
CO3	3	3	3	2	2	2	2	2	2	2
CO4	3	3	3	3	3	2	2	2	2	2
CO5	3	3	3	3	3	2	2	3	2	2

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

Mrs. J. Porkodi   Mrs. R. Nancy Beaulah
Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.C.A.

(2024-2025 onwards)

Semester I		Hours/Week: 4	
Elective Course	**DISCRETE MATHEMATICS - I**	Credits: 4	
Course Code **24UCAA11**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: define the basic concepts in propositional logic, relations, counting, graph theory and Matrices. [K1]

CO2: understand the mathematical concepts in logic, relations, permutation and combinations, graphs and matrices. [K2]

CO3: explain the concepts in predicates and quantifiers, partial orderings, recurrence relations, graphs and matrices. [K2]

CO4: solve problems in discrete mathematics. [K3]

CO5: apply the knowledge gained in discrete mathematics to other fields [K3]

UNIT I

The Foundations: Logic and Proofs: Propositional logic − Applications of Propositional logic − Propositional equivalences − (Exclude Propositional satisfiability, Applications of satisfiability, Solving satisfiability problems, and its related problems) − Predicates and Quantifiers.

(12 hours)

UNIT II

Relations: Relations and their properties − Representing relations −Partial orderings (Theorems statement only; Exclude lexicographic ordering - Exclude Lattices and Topological sorting)

(12 hours)

UNIT III

Counting: The basic of counting - The pigeonhole principle (Exclude Generalized Pigeon hole principle, some elegant applications of the pigeonhole principle) − Permutation and Combinations −

Applications of recurrence relations (Exclude algorithms and recurrence relations-solving linear recurrence relations (Exclude linear non-homogeneous recurrence relation with constant coefficients) (All theorems and Results statement only)   (12 hours)

UNIT IV

Graphs: Graphs and Graphs models, (Excluding Biological networks; Tournaments; all its related examples and problems) – Graph terminology and special types of graphs (Theorem statement only, exclude some applications of special types of graphs, new graphs from old) – Representing graphs and Graph isomorphism – Connectivity -Paths – connectedness in undirected graphs (Exclude how connected is a graph?, connectedness in directed graphs) – paths and isomorphism – counting paths between vertices – shortest path problems.   (12 hours)

UNIT V

Matrices: Introduction – operations – inverse – Rank of a matrix, solution of simultaneous linear equations – Eigen values and Eigen Vectors.   (12 hours)

TEXT BOOKS

1. Kenneth.H.Rosen (2012), *Discrete Mathematics and its applications*, Seventh Edition, McGraw-Hill Publishing Company.

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

REFERENCE BOOKS

1. Arumugam S & Thangapandi Isaac A. (2005). *Modern Algebra*, Scitech Publications.

2. Arumugam S & Ramchandran S. (2005). *Invitation to Graph Theory*, Scitech Publications, Chennai.

3. Trembley and Manuhar.(1997). *Discrete Mathematical Structures with Applications to Computer Science*, McGraw Hill.

WEB RESOURCES

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

Course Code 24UCAA11	PO1	PO2	PO3	PO4	PO5	PO 6	PO7
CO1	3	2	3	1	-	1	-
CO2	3	1	3	3	3	1	-
CO3	3	3	3	3	2	1	-
CO4	3	1	3	3	2	3	-
CO5	3	3	3	2	3	3	-

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

Dr.M.C. Maheswari   Dr.S.Kohila

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR
Quality Education with Wisdom and Values

B.C.A.
(2024-2025 onwards)

Semester I		Hours/Week: 2	
SEC-1	**PROGRAMMING IN C**	Credits: 2	
Course Code **24UCAF11**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : remember the program structure of C with its syntax and semantics. [K1]

CO2 : outline basics of computers, structure of C, constants, variables, data types, operators, expression, and control statement. [K1]

CO3 : understand the concept of top-down modular programming, collection of similar data, group of logically related data, array, pointers. [K2]

CO4 : understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, and pointers). [K2]

CO5 : associate the theory of computer basics, elements of C, operations, flow of execution, user defined and derived data types. [K2]

UNIT I

Overview of C: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables---Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.   (8 Hours)

UNIT II

Decision Making and Branching: Decision making with If, simple IF, IF ELSE, nested IF ELSE, ELSE IF ladder, switch, GOTO statement. .**Decision Making and Looping**: While, Do-While, For, Jumps in loops.   (6 Hours)

UNIT III

Arrays: Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays. (6 Hours)

UNIT IV

Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions. (7 Hours)

UNIT V

Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer. (3 Hours)

TEXTBOOK

E. Balagurusamy, *Programming in ANSI C,* Fifth Edition, Tata McGraw-Hill, 2010.

REFERENCE BOOKS

1. Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.
2. Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998.
3. YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications, 2021.

WEB RESOURCES

1. https://codeforwin.org/

2. https://www.geeksforgeeks.org/c-programming-language/

3. http://en.cppreference.com/w/c\

4. http://learn-c.org/

Course Code 24UCAF11	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	2	-	2	-	-	-	-	-	-	-
CO2	3	3	3	-	3	-	-	-	-	-
CO3	-	3	1	2	2	1	-	2	-	-
CO4	3	-	1	3	3	1	1	2	-	-
CO5	2	2	1	-	-	-	-	2	-	-

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

J.Porkodi   B.Sakthi
Head of the Department   **Course Designer**

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.C.A.
(2024-2025 onwards)

Semester II	**OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++**	Hours/Week: 5	
Core Course-3		Credits: 5	
Course Code		Internal	External
24UCAC21		25	75

COURSE OUTCOMES

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

CO1 :	outline the procedural and object oriented paradigm with concepts of classes, token, data types, functions, control statements, overloading and objects. [K1]
CO2 :	describe about classes and object, controls structures, functions, friend functions, constructor and destructor, operator overloading and inheritance. [K2]
CO3 :	paraphrase about pointer, pointers to objects, this pointer, polymorphism, virtual functions and file stream classes.[K2]
CO4 :	apply the concepts of object-oriented programming, types of inheritance, pointer concepts and operator overloading. [K3]
CO5 :	illustrate pointers, console I/O operations, strings, string functions and their attributes. [K3]

UNIT I

Principles of Object-Oriented Programming: Basic Concepts of Object Oriented Programming - Benefits of OOP. Beginning with C++: What is C++ - Applications of C++ - A Simple C++ Program –More C++ statements - Structure of a C++ program. Tokens, Data types: Introduction – Tokens – Keywords – Identifiers and Constants – Basic Data Types – User-Defined Data Types – Storage Classes - Derived Data Types – Symbolic Constants.   (15 Hours)

UNIT II

Expressions and Control Structures: Type Compatibility – Declaration of Variables – Dynamic Initialization of Variables – Reference Variables – Operators in C++ - Scope Resolution Operator – Type Cast Operator – Expressions and their Types - Control Structures. Functions in C++: Introduction – The main function – Function Prototyping – Call by Reference - Return by Reference - Inline Functions – Default Arguments. Function Overloading - Math Library Functions. Classes and Objects: Specifyi 22 ass – Defining Member Functions– C++ Program with Class - Making an Outside Function Inline – Nesting of Member Functions – Private Member Functions – Arrays with in a Class – Memory Allocation for Objects- Arrays of Objects– Friendly Functions.   (15 Hours)

UNIT III

Constructors and Destructors: Introduction – Constructors - Parameterized Constructors – Constructors with Default Arguments – Copy Constructor – Dynamic Constructors - Destructors. Operator Overloading: Introduction - Defining Operator Overloading - Overloading unary operators - Overloading Binary Operators – Overloading Binary Operators using Friends – Rules for Overloading Operators.   (15 Hours)

UNIT IV

Inheritance: Extending Classes: Introduction - Defining derived classes – Single Inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance - Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes. Pointers, Virtual Functions and Polymorphism: Pointers – Pointer to Objects – this Pointer – Polymorphism – Virtual Functions.   (15 Hours)

UNIT V

Managing Console I/O Operations: Introduction – C++ Streams - C++ Stream Classes – Unformatted I/O operation – Formatted Console I/O Operations - Managing Output with Manipulators. Manipulating Strings: Introduction – Creating (string) Objects – Manipulating String Objects – Relational Operations – String Characteristics – Accessing Characters in Strings – Comparing and Swapping.   (15 Hours)

TEXT BOOK

E.Balagurusamy, (2018). Object-Oriented Programming with C++,7th Edition, India: McGraw Hill Education Private Ltd

REFERENCE BOOKS

1. Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.

2. Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.

Course Code 24UCAC21	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	3	3	1	2	-	-	1	-
CO2	2	3	2	3	2	2	1	-	-	-
CO3	3	3	2	3	1	1	-	1	-	-
CO4	2	3	2	3	1	1	2	2	1	1
CO5	2	2	2	1	1	1	2	3	2	1

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

J. Porkodi   B. Subashini

Head of the Department   **Course Designer**

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VIRUDHUNAGAR

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B.C.A.
(2024-2025 onwards)

Semester II		Hours/Week: 5	
Core Course-4 Practical 2	**C++ PROGRAMMING PRACTICAL**	Credits: 3	
Course Code **24UCAC21P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : outline the basic concepts of classes, objects and functions. [K2]

CO2 : write the programs in C++ using OOPs concepts, user defined functions, files and handling the exceptions. [K2]

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

CO4 : illustrate the given program and answer questions related with the program. [K3]

CO5 : analyze the programs written in C++. [K3]

Write a C++ program

1. To demonstrate returning objects from classes

2. To demonstrate passing objects as function arguments

3. To swap two numbers without using intermediate variable

4. To check if a number is prime or not, using objects

5. To find larger of two numbers using inline function

6. To calculate simple interest using function using rate of interest as default argument

7. To perform Area of different shape calculation using Function overloading (Minimum three functions)

8. To perform String manipulation (three different types) using function overloading

9. To find minimum of two numbers between two class objects using friend function

10. To perform Bank Transaction using Constructor and destructor

11. To overload unary minus operator to change sign of given 3 elements

12. To overload Binary plus operator to add two complex numbers

13. To create telephone directory using single inheritance

14. To prepare a student's mark sheet using multiple inheritance

15. To prepare pay slip of an employee using hierarchical inheritance

16. To create bank account using multilevel inheritance

17. To prepare EB bill for a customer using hybrid inheritance

18. To format the output using system defined manipulators

19. To sort array of generic data

20. To perform transform the matrix

21. To find the biggest number using nesting member function

22. To calculate the mean value using friend function

| Course Code 24UCAC21P | PO1 | | PO2 | PO3 | | PO4 | | PO5 | PO6 | PO7 |
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	3	3	1	2	-	-	1	-
CO2	2	3	2	3	2	2	1	-	-	-
CO3	3	3	2	3	1	1	-	1	-	1
CO4	2	3	2	3	1	1	2	2	1	1
CO5	2	2	2	1	1	1	2	3	2	1

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

J. Porkodi   B. Subashi
Head of the Department   **Course Designer**

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B.C.A.

(2024-2025 onwards)

Semester II	**RESOURCE MANAGEMENT TECHNIQUES**	Hours/Week:4	
Generic Elective Course 2		Credits: 4	
Course Code		Internal	External
24UCAA21		25	75

Course Outcomes

On completion of the course the students will be able to

CO1: define the basic concepts of operations research, linear programming problem, assignment problem and transportation problem.[K1]

CO2: discuss models, phases, characteristics of operations research, and mathematical formulation in linear programming problem, dual, assignment problem and transportation problem.[K2]

CO3: explain various methods of linear programming problem, assignment problem and transportation problem. [K2]

CO4: solve the problems in linear programming problem, assignment problem and transportation problem. [K3]

CO5: apply the algorithms for problems in linear programming problem, assignment problem and transportation problem. [K3]

UNIT I

Development of OR –Definition of OR – Modeling in OR – General methods for solving OR models – Main Characteristics and phases of OR study – Tools Techniques and methods– Scientific methods in OR – Scope of OR .   (12Hours)

UNIT II

Linear programming problems-Mathematical formulation of L.P.P- Slack and surplus variables–Graphical solution of L.P.P, Standard form of L.P.P., Matrix form of L.P.P – Simplex Method (Without Computational Procedure)   (12Hours)

UNIT III

Artificial variables techniques, Two phase method, Duality in linear programming (Conversion only) Dual Simplex method (Theorems without proof)   (12Hours)

UNIT IV

Mathematical formulation of assignment problem – Methods for solving the assignment problem   (12Hours)

UNITV

Mathematical formulation of transportation problem – Optimal solution of T.P –Methods for obtaining initial feasible solution–degeneracy in T.P– Unbalanced T.P   (12Hours)

TEXTBOOK

Sharma, S.D.(Sixteenth Revised Edition 2009).*Operations Research*, Kedar Nath Ramnath & co.

REFERENCE BOOKS

1. P.K. Gupta, Man Mohan, Kantiswarup, *Operations Research*, Sultan Chand Publications.
2. Shankara Iyer, P.(2008).*Operations Research*,TataMc GrawHill.
3. Sharma, S.C.(2006). Introductory *Operation Research*, Discovery Publishing House

Web Resources

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

Course Code 24UCAA21	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	1	1	1	2
CO2	3	1	3	3	3	1	2
CO3	3	3	3	3	2	1	1
CO4	3	1	3	3	2	3	1
CO5	3	3	3	3	3	3	1

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

M.C.Maheswari   K.Muthulakshmi
Head of the Department   **Course Designer**

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(2024-2025 onwards)

Semester II	**OFFICE AUTOMATION PRACTICAL**	Hours/Week: 2	
SEC - 2		Credits: 2	
24UCAS21P		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : Outline the basic tools and features in Word Processing, Excel and MS Database.[K2]

CO2 : Write programs using required tools and elements to create professional and academic documents/presentations.[K2]

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

CO4 : illustrate the program by using Excel tools, formulas and functions. [K3]

CO5 : apply the necessary modifications and justify the desired result. [K3]

MS Word

1. Create a work document consists two pages in a Book named "XX" and then do the following:

   a. Formatting Text, Alignment and Font Style

   b. Perform Find and Replace

   c. Add Header and Footer option to specify name of the Book Chapter heading and Page number of total pages.

2. Create a word document having details of our College courses using bulleted and number lists. Type the title using Word Art.

3. Design a Letter to felicitate Farewell Address to our seniors with Font setting/Page Borders/Word Art/Clip Art/Symbols.

4. Create a Newsletter Article (using Columns, Drop cap) in MSword.

5. Create a time table for your Internal Exam Schedule (using Table)

6.   Type Business letter and send it to more using Mailmerge.

7.   Create your own Resume.

MS Excel

1. Create and Excel worksheet consists of Student details and then do the following:
    a. Calculate student wise total and subject wise total.
    b. Find the Maximum and Minimum marks of the subject.
    c. Filter the records to answer the give criteria(Auto Filter/Advanced Filter)
    d. Sort the records.
2. Create an Excel worksheet having Employee details suitably and then do following.
    a. Format the cells.
    b. Use functions to calculate Net Pay and Gross Pay.
    c. Perform conditional formatting and validation.
3. Create a chart for the above exercise 2.
4. Create a macro.

MS Power Point

1. Create a Power point presentation showing your various activities of the department.
2. Create a Power point presentation showing various aspect of your college and perform custom animation and import sound.
3. Create a presentation using design templates and then perform the following one:
4. Include Table and chart from file.
5. Include Picture and run the presentation using auto play.
6. Perform Hyper link within slides and link other documents.

MS Access

1. Create a Student Database having Name, Regno, Tamil, English, Maths, Total, and
    ii. find the Average
2. Create an Inventory database having Item Name, Item no. Quantity and Price and Perform query operation to retrieve data.
    a. Create a form to enter the details of Book database.
    b. Create report for the above database.

Course Code 24UCAS21P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	3	2	2	2	1	-	-
CO2	3	3	-	1	1	-	-	-	2	-
CO3	3	2	2	3	3	2	2	2	-	1
CO4	2	2	-	2	2	2	2	-	1	-
CO5	1	1	2	3	3	3	3	1	1	-

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

J. Porkodi   V.G. Jyothi Mani

Head of the Department   **Course Designer**

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(2024-2025 onwards)

Semester III		Hours/Week: 5	
Core Course - 5	**DATA STRUCTURES AND ALGORITHMS**	Credits: 5	
Course Code **24UCAC31**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : gain the knowledge on concepts of pointers, arrays and graphs.[K1]

CO2 : under the concepts of stack , queue, linked list and trees[K2]

CO3 : ability to develop applications of stack , queue and trees. [K2]

CO4 : practise with various sorting, searching and hashing functions. [K3]

CO5 : apply various linear & non- linear data structures and its operations. [K3]

UNIT I

List, Stack and Queues: Abstract Data Types (ADTS) - List ADT – Simple array implementation of lists – Simple linked lists. Implementation of Lists.

(15 Hours)

UNIT II

List, Stack and Queues: Stack ADT - Stack model – Implementation of stack - Applications - Evaluating arithmetic expressions- Conversion of infix to postfix expression – Queue ADT- Queue model - Implementation of Queues - Applications of Queues   (15 Hours)

UNIT III

Trees: Implementation of Trees - The Tree traversals with its applications – Binary Trees : Implementation - expression trees – The search tree ADT : Binary search Trees - contains – findmin and findmax insert – remove – Destructor and copy constructor - AVL Trees: Single rotation - B-Trees. (15 Hours)

UNIT IV

Hashing: General Idea – Hash Function – Separate Chaining – Hash table without Linked lists – Rehashing. **Sorting:** Preliminaries – Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort. (15 Hours)

UNIT V

Graph Algorithms: Definition - Representation of Graphs - Topological Sort – Shortest path Algorithms – Unweighted Shortest Paths - Dijkstra's Algorithms – Graphs with negative Edge Costs – Acyclic Graphs – All Pairs Shortest Path. (15 Hours)

TEXT BOOKS

1. Mark Allen Weiss. (2014). *Data Structures and Algorithm Analysis in C++*, Pearson Education, 4th Edition.

2. Reema Thareja. (2014). *Data Structures Using C*, Oxford Universities Press , 2nd Edition

REFERENCE BOOKS

1. Thomas H.Cormen,Chales E.Leiserson,Ronald L.Rivest, Clifford Stein. (2009). *Introduction to Algorithms*, McGraw Hill, 3rd Edition

2. Aho, Hopcroft and Ullman. (2003). *Data Structures and Algorithms*, Pearson Education.

Unit	Chapter	Page No
I	3	3.1, 3.2, 3.3, 3.4, 3.5
II	3	3.6, 3.7
III	4	4.1, 4.2, 4.3, 4.4, 4.7
IV	5, 7	5.1, 5.2, 5.3, 5.4, 5.5, 7.1, 7.2, 7.4, 7.5, 7.6, .77
V	9	9.1, 9.2, 9.3.1, 9.3.2, 9.3.3, 9.3.4, 9.3.5

Course Code 24UCAC31	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	-	3	-	1	-	-	-	-	-
CO2	3	-	3	-	2	-	-	-	-	-
CO3	3	3	2	3	2	1	1	2	-	1
CO4	2	2	2	-	2	2	1	1	-	-
CO5	2	3	1	1	-	-	-	2	-	1

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

J.Porkodi   J.Porkodi

Head of the Department   **Course Designer**

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B.C.A.

(2024-2025 onwards)

Semester III		Hours/Week: 5	
Core Course - 6 Practical – 3	**DATA STRUCTURES AND ALGORITHMS USING C++ PRACTICAL**	Credits: 3	
Course Code **24UCAC31P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : understanding the concepts of arrays for solving real life problems. [K2]

CO2 : Write programs using stack, queue, linked list for data manipulation using array and linked list concept. [K2]

CO3 : apply the step-by-step process of a sorting or searching algorithm given an input set. [K3]

CO4 : apply the usage of stack and queue by developing a program with neat output. [K3]

CO5 : identify constructive techniques for building binary tree and binary search tree with modification. [K3]

1. Write a program to implement the List ADT using arrays and linked lists.

2. Write a program to implement the following using a singly linked list.

    a. Stack ADT

    b. Queue ADT

3. Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT)

4. Write a program to implement priority queue ADT.

5. Write a program to perform the following operations:

    a. Insert an element into a binary search tree.

    b. Delete an element from a binary search tree.

    c. Search for a key element in a binary search tree.

6. Write a program for the implementation of BFS and DFS for a given graph.

7. Write a program for implementing the following searching methods:

   a. Linear search

   b. Binary search.

8. Write a program for implementing the following sorting methods:

   a. Bubble sort

   b. Selection sort

   c. Insertion sort

Course Code 24UCAC31P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	2	3	-	1	2	2	-	-	-
CO2	3	3	1	-	-	2	-	-	2	-
CO3	2	3	1	1	-	2	-	-	-	2
CO4	3	2	-	-	-	-	2	1	1	-
CO5	3	2	2	-	1	2	-	-	1	1

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

J. Porkodi   J. Porkodi

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.C.A.
(2024-2025 onwards)

Semester III		Hours/Week: 4	
Allied Course	**NUMERICAL METHODS**	Credits: 4	
Course Code **24UCAA31**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Recall the fundamental concepts of algebraic, transcendental and simultaneous equations.[K1]

CO2: Derive the solutions of equations by various iterative methods. [K2]

CO3: Find the missing data by using interpolation and inverse interpolation methods.[K2]

CO4: Perform numerical differentiation and integration to find the derivatives and integral value numerically.[K3]

CO5: Apply Taylor series method, Picard's method, Euler's and Runge-kutta methods to obtain the solution of the initial value problems. [K3]

UNIT I

Algebraic and Transcendental Equations:

Introduction - Errors in numerical computation-Iteration method-Bisection method-Regula-Falsi method-Newton-Raphson method-Horner's method. (12 hours)

UNIT II

Simultaneous Equations:

Introduction-Simultaneous equations-Back substitution-Gauss Elimination method-Gauss-Jordan Elimination method-Calculation of Inverse of a matrix- Crout's method-Iterative methods-Gauss-Jacobi Iteration method- Gauss Seidal Iteration method-Newton Raphson's method for simultaneous equations. (12 hours)

UNIT III

Interpolation

Introduction - Newton's interpolation Formula - Central difference Interpolation Formulae-Gauss Forward Interpolation Formula, Gauss Backward Interpolation Formula,

Lagrange's Interpolation Formula - Divided Differences-Newton's Divided Difference Formula-Inverse Interpolation. (12 hours)

UNIT IV

Numerical Differentiation and Integration:

Introduction - Derivatives using Newton's forward difference Formula - Derivatives using Newton's backward difference Formula.

Numerical Integration: Newton-cotes quadrature -Trapezoidal Rule-Simpson's one third rule-Simpson's 3/8th rule. (12 hours)

UNIT V

Numerical Solution of Ordinary Differential Equations:

Introduction-Taylor series method-Picard's method-Euler's method-Runge-kutta method of second, third, fourth order- Predictor & corrector methods-Milne's method.

(12 hours)

TEXT BOOK

Arumugam. S, Thangapandi lssac.A, Somasundaram.A, *Numerical Methods*, Second Edition, Scitech Publications. Reprint, December 2013.

Unit	Chapter	Section
I	3	3.0 - 3.6
II	4	4.0 - 4.8, 4.10
III	7	7.0 - 7.2((i), (ii) and related problems), 7.3, 7.4,7.5, 7.6
IV	8	8.0 - 8.2,8.5 (excluding Weddles rule, Booles rule, Romberg's method and related problems)
V	10	10.0 - 10.2, 10.3(excluding modified Euler's method & its related problems), 10.4 - 10.6

REFERENCE BOOK

1. Mathews J.H. Numerical Method for Maths, Science and Engineering: PHI, New Delhi, 2001.

2. P.Kandasamy, K.Thilagavathy, K.Gunavathy, Numerical Methods (2016), S.Chand & Company Ltd., New Delhi-55.

3. P.Duraipandian and Dr.S.Udayabaskaran, Allied Mathematics Volume I (2014), S.Chand & Company Ltd., New Delhi-55.

SELF STUDY

Modified Euler's method

WEB RESOURCES

https://27x37.files.wordpress.com/2011/05/mcgraw-hill-numerical-methods-using-matlab.pdf

Course Code 24UCAA31	PO1	PO2	PO3	PO4	PO5	PO 6	PO7
CO1	3	2	1	3	1	1	- -
CO2	3	2	1	3	2	1	-
CO3	3	1	1	3	2	1	-
CO4	3	2	1	3	2	1	-
CO5	2	2	1	3	2	1	-

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

Dr.M.C.Maheswari   Dr.M.Uma Maheswari
Head of the Department   **Course Designer**

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VIRUDHUNAGAR

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B.C.A.
(2024-2025 onwards)

Semester III		Hours/Week: 1
SEC -3	**QUANTITATIVE APTITUDE**	Credit: 1
Course Code **24UCAS31**		Internal 100

COURSE OUTCOMES

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

CO1 : observe the real life situations and relate it with aptitude problems. [K1]

CO2 : identify the concept of problems on numbers, ages, ratio, time and work, simple interest and compound interest. [K1]

CO3 : express the practical problem using the fundamentals of mathematics. [K2]

CO4 : gain the knowledge in aptitude and enhance their knowledge for successful career. [K2]

CO5 : estimate the numerical aptitude problems and get optimum solution for the betterment of humanity. [K3]

UNIT I

Numbers — Average – Problems on Numbers.

(3 Hours)

UNIT II

Problems on Ages – Profits and Loss – Ratio and Proportion.

(3 Hours)

UNIT III

Time and work – Time and Distance - Problems on Trains.

(3 Hours)

UNIT IV

Permutation and Combination – Probability – Odd-man Out & Series.

(3 Hours)

UNIT V

Data Interpretation – Tabulation – Bar Graphs - Pie Charts – Line graphs.

(3 Hours)

TEXT BOOK

1. R.S. AGGARWAL., Quantitative Aptitude, S.Chand & Company Ltd.,

Unit	Chapter	Problems
I	1,6,7	Solved Examples- Upto 10 Problems
II	8,11,12	
III	15,17,18	
IV	30,31,35	
V	36,37,38,39	

REFERENCE BOOKS

1. Tyagi, R.K. (2018-19). *Quantitative Aptitude for Competitive Examinations*, Edition,

2. Er. Deepak Agarwal. *Quantitative Aptitude,* Disha Publisher.

Web Resources:

1. https://www.javatpoint.com/aptitude/quantitative

2. https://www.topper.com/guides/quantitative-aptitude/

Course Code **24UCAS31**	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	1	3	3	3	3	1	2	-
CO2	3	3	1	3	3	2	2	1	2	-
CO3	3	3	-	3	3	2	2	1	2	-
CO4	3	3	-	3	3	1	1	1	2	-
CO5	3	3	-	3	3	2	2	1	2	-

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

Mrs. J. Porkodi   Mrs. B. Sakthi
Head of the Department   **Course Designer**

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Quality Education with Wisdom and Values

B.C.A.
(2024-2025 onwards)

Semester III		Hours/Week: 2	
SEC - 4	**PROBLEM SOLVING TECHNIQUES**	Credits: 2	
Course Code **24UCAS32**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : Recall fundamental concepts of algorithms and problem-solving techniques. [K1]

CO2 : outline fundamental algorithms, factoring methods, array techniques, text processing and pattern matching. [K1]

CO3 : interpret basic algorithmic strategies, problem solving strategies and fundamental algorithms.[K2]

CO4 : summarize factoring methods, array techniques, text processing and pattern matching. [K2]

CO5 : relate various problem-solving strategies, factoring methods, array techniques and text processing methods. [K3]

UNIT I

Introduction: Notion of algorithms and programs – Requirements for solving problems by computer – The problem-solving aspect - Implementation of algorithms. (6 Hours)

UNIT II

Fundamental Algorithms: Exchanging the values of two variables – Counting - Summation of a set of numbers - Factorial computation - Fibonacci Series generation - Reversing the digits of an integer. (6 Hours)

UNIT III

Factoring Methods: Finding the square root of a number – The smallest divisor of an integer – Greatest common divisor of two integers - Generating prime numbers – Computing the prime factors of an integer. (6 Hours)

UNIT IV

Array Techniques: Array order reversal – Array counting or histograming – Finding the maximum number in a set - Removal of duplicates from an ordered array - Partitioning an array – Finding the kth smallest element. (6 Hours)

UNIT V

Text Processing and Pattern Searching: Text line length adjustment – Left and right justification of text – Keyword searching in text – Text line editing. (6 Hours)

TEXT BOOK

R. G. Dromey. (2007). *How to Solve it by Computer*, Pearson India.

Unit	Chapters	Sections
I	1	1.1,1.2, 1.4
II	2	2.1-2.4, 2.7
III	3	3.1-3.5
IV	4	4.1-4.6
V	6	6.1-6.4

REFERENCE BOOKS

1. George Polya, Jeremy Kilpatrick. (2009). *The Stanford Mathematics Problem Book: With Hints and Solutions*, Dover Publications. (Kindle Edition 2013).

2. Greg W. Scragg. (1996). *Problem Solving with Computers*, Jones & Bartlett 1st edition.

Web Resources
1. https://www.studytonight.com/
2. https://www.w3schools.com/

Course Code 24UCAS32	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	3	3	3	3	2	1	1
CO2	3	3	2	2	2	3	2	2	1	1
CO3	3	3	2	2	3	2	2	3	2	1
CO4	3	3	3	3	2	2	2	2	2	1
CO5	3	3	2	3	3	3	3	2	2	1

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

J. Porkodi   R. Nancy Beaulah
Head of the Department   **Course Designer**

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.C.A.
(2024-2025 onwards)

Semester IV		Hours/Week: 5	
Core Course - 7	**PROGRAMMING IN JAVA**	Credits: 5	
Course Code **24UCAC41**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : gain knowledge on the concept of object oriented programming. [K1]

CO2 : identify the introductory concepts of classes, methods, constructor, inheritances, interfaces, packages, threading, exceptions, I/O Streams, applet, AWT & swing programming. [K2]

CO3 : apply OOP concepts in problem solving and programming concepts in implementing AWT and event handling [K2]

CO4 : analyze and use Java in a variety of applications, use of Applet, AWT and swing to create GUI. [K3]

CO5 : choose real world applications and solve it using Java Core Application, Applet, AWT and swing. [K3]

UNIT I:

    Introduction: Review of Object Oriented concepts – History of Java – Java buzzwords – Data types - Literals - Variables - Scope and lifetime of variables - type conversion and casting - arrays – operators. (15 Hours)

UNIT II:

    Control statements: If- Nested ifs - If else if - switch. **Iteration Statements:** While - do while - For. **Jump Statements:** break - continue and return. **Classes:** Class Fundamentals - Declaring Objects - Methods - Constructors - this keyword - Overloading methods – Recursion. **Inheritance**: Basic concepts. (15 Hours)

UNIT III:

Packages: Definition - Access Protection – Importing Packages. **Interfaces**: Definition – Implementation – Extending Interfaces. **Exception Handling**: Fundamentals - Exception types - Uncaught Exception - try and catch - throw - throws – finally – Built-in exceptions - Creating own Exception Subclasses. **Creating a Thread:** Implementing Runnable – Extending Thread. **I/O Streams:** Concepts of streams - Stream classes - Byte and Character stream - Reading console Input and Writing Console output.   (17 Hours)

UNIT IV:

Applet Class: Applet Basics – An Applet Skeleton – Simple Applet Display Methods – Requesting Repainting - HTML Applet Tag - Passing Parameters to Applets. **Event Handling:** Delegation Event Model - Event classes – Sources of Events – Even Listener Interfaces.

(14 Hours)

UNIT V:

AWT Controls: Control Fundamentals - Labels - Button - Check Boxes - CheckBoxGroup - Choice controls - Lists. **Swing**: JApplet – Icons and Labels – Text fields – Buttons.   (14 Hours)

TEXT BOOK
1. Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.

Unit	Chapter	Pages
I	1, 3, 4,	4 to 15, 42 to 58, 61 to 69, 74 to 96,
II	5, 6, 7 8,	100 to 115, 119 to 127 130 to 149, 156 to 159,169 to 170. 190 to 195.
III	9, 10, 11, 12	224 to 247, 250 to 253, 260 to 269. 280 to 284 314 to 323.
IV	19, 20,	628 to 646 654 to 672
V	22 26	736 to 753 921 to 929

REFERENCE BOOKS

1. Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010.

2. Gary Cornell, *Core Java2 VolumeI – Fundamentals,* Addison Wesley,1999

3. Head First Java, O'Rielly Publications,

WEB RESOURCES:

1. https://javabeginnerstutorial.com/core-java-tutorial
2. http://docs.oracle.com/javase/tutorial/
3. https://www.coursera.org/

Course Code 24UCAC41	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	-	1	2	2	-	-	-	-	-
CO2	-	2	2	1	1	1	-	1	-	-
CO3	1	2	1	1	-	-	1	-	-	-
CO4	1	1	2	3	-	1	1	-	-	-
CO5	1	1	1	1	1	1	-	-	-	-

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

J. Porkodi   V.G. Jyothi Mani

Head of the Department   **Course Designer**

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VIRUDHUNAGAR

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B.C.A.
(2024-2025 onwards)

Semester IV		Hours/Week: 4	
Core Course – 8 Practical - 4	**PROGRAMMING IN JAVA PRACTICAL**	Credits: 3	
Course Code **24UCAC41P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1　：　Understand the perspectives of Java to solve problems. [K2]

CO2　：　learn the basics knowledge to develop programs implementing classes, methods, inheritances, interfaces, packages, multithreading, exception, applet & graphics programming and swing. [K2]

CO3　：　analyze to build and modify the codes to produce required output. [K3]

CO4　：　Present output effectively and prepare the record. [K3]

CO5　：　Design the necessity test for programs with modifications and justify the results. [K3]

Write a Java program

1. To demonstrate methods Declaration and creating objects from classes.

2. To demonstrate returning objects from classes.

3. To perform palindrome checking using objects.

4. To check if a number is prime or not, using objects.

5. To find the largest values of two numbers using nesting of member function.

6. To perform matrix Multiplication using array.

7. To sort the student names using string arrays.

8. To perform manipulation of strings (Minimum three function).

9. To find the sum of the digit of a given number using constructor overloading.

10. To perform Area calculation using parametric/ default constructor.

11. To prepare a student's mark sheet using single inheritance.

12. To implement Exception handling.

13. To prepare pay slip of an employee using interface.

14. To simulate a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "stop" or "ready" or "go" should appear above the buttons in a selected color. Initially there is no message shown.

Course Code 24UCAC41P	PO1	PO2		PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	1	1	1	1	-	-	-	-	-
CO2	2	1	2	1	1	-	-		-	-
CO3	2	1	1	1	1	1	-	-	-	-
CO4	1	2	2	2	2	1	1	-	-	-
CO5	1	1	1	1	1	1	1	-	-	-

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

J. Porkodi   V.G. Jyothi Mani

Head of the Department   **Course Designer**

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VIRUDHUNAGAR

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B.C.A.
(2024-2025 onwards)

Semester: IV		Hours/Week: 4	
Elective Course -4	**DIGITAL LOGIC FUNDAMENTALS**	Credits: 4	
Course Code **24UCAA41**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : define number system, codes, basics of Boolean Algebra, Arithmetic Circuits, Flip-Flops, Counters, Registers. [K1]

CO2 : describe the concept of logic gates, arithmetic circuits and combinational circuits, Flip Flops, Counters, Registers. [K2]

CO3 : demonstrate number systems, codes, boolean algebra, K-map, logic gates, binary arithmetic, Combinational circuits, Flip-Flops, Registers. [K2]

CO4 : solve number conversions and boolean expressions, apply gates to design, combinational circuits, Flip-Flops, Counters, Registers. [K3]

CO5 : compare and analyze number systems, codes, boolean algebra, logic gates, combinational circuits, Flip-Flops, Counters, Registers. [K3]

UNIT I

Number System and Codes: Introduction – Number Systems – Arithmetic Operation – 1's and 2's Complements – 9's Complement – 10's Complement – Binary Coded Decimal (BCD) – Codes. **Boolean Algebra and Minimization Techniques:** Introduction – Development of Boolean Algebra - Boolean Logic Operations – Basic Laws of Boolean Algebra – Demorgan's Theorems. (12 Hours)

UNIT II

Boolean Algebra and Minimization Techniques: - – Sum of Product and Product of Sums - Karnaugh Map**. Logic Gates:** Introduction, Positive and Negative Logic Designation - Logic Gates - Mixed Logic - Multilevel Gating Networks - Multiple Output Gate Networks.

(12 Hours)

UNIT III

Arithmetic Circuits: Introduction **-** Procedure for the Design of Combinational Circuits – Half- Adder – Full-Adder – K-Map Simplification – Half-Subtractor – Full-Subtractor – Parallel Binary Adder – Controlled Inverter – 4-bit Parallel Adder/Subtractor – Fast Adder - Serial Adder – Serial Adder using 2's Complement - 4-bit Serial Adder/Subtractor – BCD Adder – Binary Multiplier – Binary Divider.   (10 Hours)

UNIT IV

Combinational Circuits: Introduction **-** Multiplexers (Data Selectors) – Applications of Multiplexer - Demultiplexers (Data Distributors) – Decoders: Basic Binary Decoder – 3-to-8 Decoder – 4-to-16 Decoder – Encoders: Octal-to-Binary Encoder – Decimal-to-BCD Encoder – Priority Encoder. Parity Generators/Checkers – Parity Generation – Code Converters.

(10 Hours)

UNIT V

Flip-Flops: Introduction – Latches - Flip-flops – S-R Flip-flop – D Flip-flop – J-K Flip-flop – T Flip-flop – Master –Slave Flip-flops. Applications of Flip- flops. **Counters:** Introduction - Asynchronous (Ripple or Serial) Counter - Counter Implementation and Applications. **Registers:** Introduction - Shift Registers: Serial-in-Serial-out Shift Register - Serial-in-Parallel-out Shift Register – Parallel -in-Serial-out Shift Register Parallel-in-Parallel-out Register – Sequence Generator.   (16 Hours)

TEXT BOOK

S.Salivahanan, S.Arivazhagan. (2013). *Digital Circuits and Design,* Fourth Edition, Vikas Publishing House Pvt. Ltd.

Unit	Chapters	Sections
I	1,2	1.1,1.2,1.4-1.9,2.1-2.5
II	2,3	2.6, 2.7,3.1-3.6
III	5	5.1-5.17
IV	6	6.1-6.5(6.5.1-6.5.3),6.7(6.7.1-6.7.3)6.8-6.10
V	7,8,9	7.1-7.7,7.10,7.12 8.1,8.2,8.16 9.1,9.2(9.2.1,9.2.3,9.2.5,9.2.7),9.6

REFERENCE BOOKS

1. M.Morris Mano. *Computer System Architecture*, Third Edition, Pearson Publications.

2. M.MorrisMano. (2013). *Digital Logic and Computer Design*, Fifteenth Impression, Pearson Prentice Hall.

3. Donald D.Givone. (2002). *Digital Principles and Design*, Fifteenth reprint 2009, Tata McGraw Hill edition.

Course Code 24UCAA41	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	2	-	2	-	-	-	-	-	-	-
CO2	3	3	2	-	2	-	-	-	-	-
CO3	-	3	1	2	2	1	-	2	-	-
CO4	3	-	1	3	3	1	1	2	-	-
CO5	2	2	1	-	-	-	-	2	-	-

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

Mrs. J. Porkodi   Mrs. S. Aarthi Prasanna

Head of the Department   **Course Designer**

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B.C.A.
(2024-2025 onwards)

Semester: IV		Hours/Week: 2	
SEC-5	**SOFTWARE PROJECT MANAGEMENT**	Credits: 2	
Course Code		Internal	External
24UCAS41		25	75

COURSE OUTCOMES

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

CO1 : define and understand the principles and concepts of project management, process, goal and scope, cost estimating, scheduling, and software configuration management. [K1]

CO2 : describe the concept of knowledge gained to train software project management, process, work breakdown structure, cost estimating, dependencies, scheduling and software configuration management. [K1]

CO3 : Apply software project management methodologies, work breakdown structure, cost estimating and Scheduling. [K2]

CO4 : Able to create project plans, work breakdown structure, cost estimating, dependencies, scheduling, software configuration management. [K2]

CO5 : compare and analyze goal and scope, cost estimating, considering dependencies, and scheduling associated with software development process. [K3]

UNIT I

Introduction to Competencies - Product Development Techniques - Management Skills.

(6 Hours)

UNIT II

Managing Domain Processes - Project Selection Models – Project Portfolio Management - Financial Processes - Goal and Scope of the Software Project - Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.   (6 Hours)

UNIT III

Cost Estimation - Effort Measures – COCOMO: A Regression Model – COCOMO II SLIM: A Mathematical Model. (6 Hours)

UNIT IV

Software Development Dependencies - Brainstorming - Scheduling Fundamentals – PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling. (6 Hours)

UNIT V

Software Configuration Management: Principles -Requirements-Planning and Organizing-Tools-Benefits. (6 Hours)

TEXT BOOK

Robert . Futrell, Donald F.Shafer, LindaI.Safer. (2002). *Quality Software Project Management*, Pearson Education Asia.

Unit	Chapters	Page Numbers
I	1	1-8, 27-61
II	5	210-214, 227-235
	7	291-301
	8	322-346
III	11	466-527
IV	14	611-633
	15	640-671
V	31	1589-1617

REFERENCE BOOKS

1. Pankaj Jalote. (2002). *Software Project Management in Practice*, Addison Wesley.

2. Hughes. (2004). *Software Project Management*, Tata Mc Graw Hill 3rd Edition.

Course Code 24UCAS41	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	2	3	2	-	1	3	-	3	1	-
CO2	2	3	1	-	2	3	2	3	-	-
CO3	3	3	-	1	1	2	-	3	3	-
CO4	2	3	3	2	1	3	2	2	-	1
CO5	2	2	2	-	1	3	2	3	3	1

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

Mrs. J. Porkodi   Mrs. S. Aarthi Prasanna
Head of the Department   **Course Designer**

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B.C.A.
(2024-2025 onwards)

Semester IV		Hours/Week: 2	
SEC-6	**PHP PROGRAMMING**	Credits: 2	
Course Code **24UCAS42**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : define and understand the concepts of PHP scripts, variables, data types, operators, control flow, functions, strings, arrays, sessions and cookies. [K1]

CO2 : describe the principles which includes PHP scripts, variables, data types, operators, control flow, functions, strings, arrays, sessions and cookies. [K1]

CO3 : Apply and Create PHP Program using the concept of PHP scripts, variables, data types, operators, control flow, functions, arrays, sessions and cookies. [K2]

CO4 : Able to create PHP programs that use various PHP scripts, variables, data types, operators, control flow, functions, strings, arrays, sessions and cookies. [K2]

CO5 : compare and analyze PHP scripts, variables, data types, operators, control flow, functions, strings, arrays, sessions and cookies. [K3]

UNIT I

Essential PHP : Enter PHP - Getting PHP - Creating Your Development Environment - Creating a First PHP Page - Running Your First PHP Page - Mixing HTML and PHP - Printing Some Text - Printing Some HTML - More Echo Power - Using PHP "Here" Documents – Command-Line PHP - Adding Comments to PHP Code - Working with Variables - Storing Data in Variables - Interpolating Strings - Creating Variable Variables - Creating Constants - Understanding PHP's Internal Data Types. (6 Hours)

UNIT II

Operators and Flow Control : PHP's Math Operators - Working with the Assignment Operators - Incrementing and Decrementing Values - The PHP String Operators - The Bitwise Operators - The Execution Operator - PHP Operator Precedence - Using the if Statement - The

PHP Comparison Operators - The PHP Logical Operators - The else Statement - The else if Statement - The ternary Operator - The switch Statement - Using for Loops - Using while Loops - Using do… while Loops - Using the for each Loop - Terminating Loops Early - Skipping Iterations - PHP Alternate Syntax.   (7 Hours)

UNIT III

Strings and Arrays : The String Functions - Converting to and from Strings - Formatting Text Strings - Building Yourself Some Arrays - Modifying the Data in Arrays - Deleting Array Elements - Handling Arrays with Loops - The PHP Array Functions - Converting Between Strings and Arrays Using Implode and Explode - Extracting Data from Arrays - Sorting Arrays - Using PHP's Array Operators - Comparing Arrays to Each Other - Handling Multidimensional Arrays - Using Multidimensional Arrays in Loops - Moving Through Arrays - Splitting and Merging Arrays - Other Array Functions.   (7 Hours)

UNIT IV

Creating Functions : Creating Functions in PHP - Passing Functions Some Data - Passing Arrays to Functions - Passing by Reference - Using Default Arguments - Passing Variable Number of Arguments - Returning Data from Functions - Returning Arrays - Returning Lists - Returning References - Introducing Variable Scope in PHP - Accessing Global Data - Working with Static Variables.   (5 Hours)

UNIT V

Creating Functions: PHP Conditional Functions - PHP Variable Functions - Nesting Functions - Creating Include Files - Returning Errors from Functions**. Sessions and Cookies :** Setting a Cookie - Reading a Cookie - Setting Cookies Expiration - Deleting Cookies - Storing Data in Sessions - Writing a Hit Counter using Sessions.   (5 Hours)

TEXT BOOKS

Steven Holzner.(2008). *PHP : The Complete Reference* , Tata Mc Graw Hill, 10th Edition. Alan Forbes.

Unit	Chapters	Page Numbers
I	1	1-40
II	2	41-80
III	3	81-122
IV	4	123-149
V	4 11	150-159 395-401,425-432

REFERENCE BOOKS

1. Lynn Mighley and Michael Morrison.(2002). *Head First PHP & MySQL : A Brain-Friendly Guide*, O'Reilly Media, Inc.

2. Alan Forbes *The joy of PHP: A Beginner's Guide to Programming interactive Web Applications with PHP and MySQL.*

3. Steve Suehring, Tim Converse, Joyce Park. (2009). *PHP 6 and MySQL 6* Bible, Wiley Publishing, Inc.,

4. DT Editorial Services. (2016). *HTML 5 Black Book* (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Paperback, 2nd Edition.

Course Code 24UCAS42	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	-	2	1	-	2	1	1	2	1
CO2	3	2	3	2	-	2	-	2	-	1
CO3	3	-	3	-	1	3	1	3	1	-
CO4	3	1	2	3	1	2	-	2	3	1
CO5	3	-	2	2	1	2	1	3	3	-

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

Mrs. J. Porkodi   **Mrs. S. Aarthi Prasanna**

Head of the Department   Course Designer

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.C.A.
(2024-2025 onwards)

Semester V	**OPERATING SYSTEMS**	Hours/Week: 6	
Core Course - 9		Credits: 6	
Course Code **24UCAC51**		Internal 25	External 75

COURSE OUTCOMES

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

CO1	:	describe the concepts of process, deadlocks, memory management, virtual memory, file system and I/O systems, examine computer system structures . [K1]
CO2	:	outline the process and memory management policies, explain file system, disk and I/O systems. [K2]
CO3	:	identify memory, disk and swap space management and I/O systems, solve the problems to achieve process synchronization. [K2]
CO4	:	explain how the file systems are implemented, classify CPU scheduling and Disk scheduling, examine deadlocks. [K3]
CO5	:	measure process scheduling, summarize paging and segmentations, assess page replacement algorithms and disk scheduling algorithms. [K3]

UNIT I

   Introduction: What is an operating system? – Mainframe systems–Desktop systems. Operating System Structures: System components – Operating system services. Processes: Process Concept – Process Scheduling – Operations on processes – Cooperating processes.

(18 Hours)

UNIT II

CPU Scheduling: Basic concepts – Scheduling criteria – Scheduling algorithms: First Come First Served Scheduling – Shortest Job First Scheduling – Priority Scheduling – Round Robin

Scheduling. Process Synchronization: Background – The Critical-Section Problem – Semaphores. (18 Hours)

UNIT III

Deadlocks: System model – Deadlock Characterization – Methods for handling Deadlocks - Deadlock prevention– Deadlock avoidance, Deadlock detection – Recovery from deadlock. Memory Management: Background – Swapping – Contiguous memory Allocation– Paging (Basic method, Protection)–Segmentation. (18 Hours)

UNIT IV

Virtual Memory: Background – Demand paging- Page replacement. File-System Interface: Directory structure: single Level Directory – Two Level Directory – Tree Structured Directories. File-System Implementation: Directory implementation – Allocation methods (Contiguous, Linked and Indexed Allocation methods). (18 Hours)

UNIT V

Computer System Structures: Computer System operation- I/O Structure – Storage Structure. Mass-Storage Structure: Disk structure – Disk scheduling, Disk management, Swap space management. (18 Hours)

TEXT BOOK

Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. (2007). *Operating System Concepts, Windows XP Update*, 6thEdition. Wiley India (P.) Ltd.

Unit	Chapters	Sections
I	1, 3, 4	1.1 - 1.3, 3.1 - 3.2, 4.1 - 4.4
II	6, 7	6.1, 6.2, 6.3.1 - 6.3.4 , 7.1, 7.2, 7.4
III	8,9	8.1 - 8.7, 9.1 - 9.3,9.4.1,9.4.3,9.5
IV	10, 11, 12	10.1,10.2,10.4, 11.3.1-11.3.3, 12.3, 12.4.1-12.4.3
V	2, 14	2.1-2.3, 14.1-14.4

REFERENCE BOOK

William Stallings. (2012). *Operating System: Internals and Design Principles*, Seventh Edition, Prentice-Hall of India.

Course Code 24UCAC51	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	-	-	-	-	-	-	-
CO2	-	2	2	2	2	-	-	-	-	-
CO3	2	2	2	3	3	1	1	2	-	-
CO4	2	-	1	2	3	1	1	2	-	-
CO5	-	2	1	-	-	-	-	3	-	-

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

Mrs. J. Porkodi	Mrs. V.G. Jyothi Mani
Head of the Department	**Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

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B.C.A.
(2024-2025 onwards)

Semester V		Hours/Week: 6	
Core Course - 10	**ASP .NET PROGRAMMING**	Credits: 6	
Course Code **24UCAC52**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : outline .NET Framework fundamentals, ASP.NET Web forms, Validation and Rich controls, Files and ADO.NET. [K1]

CO2 : paraphrase about the basic concepts of .NET Framework, ASP.NET and Web form controls. [K2]

CO3 : relate about ASP. Net Validation and Rich controls, files, ADO. NET and database connectivity. [K2]

CO4 : apply the concepts of .NET Languages, ASP.NET and Web form controls. [K3]

CO5 : make use of ASP. Net Validation and Rich controls, files and ADO. NET to develop web applications. [K3]

UNIT I

Overview of .NET Framework: The .NET Framework – The .NET Programming Framework – VB. NET, C# and the .NET Languages – The Common Language Runtime – The .NET Class Library – ASP.NET – Visual Studio .NET. Learning the .NET Languages: The .NET Languages – Data Types – Declaring Variables – Scope and Accessibility – Variable Operations – Object-Based Manipulation – Conditional Structures – Loop Structures – Functions and Subroutines.   (18 Hours)

UNIT II

Web Form Fundamentals: A Simple Page Applet – Improving the Currency Converter – A Deeper Look at HTML Control Classes – The Page Class – Assessing HTML Server Controls. Web Controls: Stepping Up to Web Controls – Web Control Classes.   (18 Hours)

UNIT III

Validation and Rich Controls: Validation and Rich Controls – Validation – A Simple Validation Example – Understanding Regular Expressions – A Validated Customer Form – Other Rich Controls. Files, Streams and Email: Files and Web Applications – File System Information – Reading and Writing with Streams – Allowing File Uploads – Sending Mail.

(18 Hours)

UNIT IV

ADO.NET Data Access: About the ADO.NET Examples – SQL Basics – The SQL Select Statement – The SQL Update Statement – The SQL Insert Statement – The SQL Delete Statement – Accessing Data the Easy Way – Creating a Connection – Defining a Select Command – Using a Command with a DataReader – Updating Data – Accessing Disconnected Data – Selecting Multiple Tables – Modifying Disconnected Data – Updating Disconnected Data.

(18 Hours)

UNIT V

The DataList, DataGrid and Repeater: Introducing Templates – Using Templates with the DataList – Data Binding with Multiple Templates – Comparing the Template Controls – Preparing List for Selection and Editing – Editing Items – Paging with the DataGrid – Sorting with the DataGrid. (18 Hours)

TEXT BOOKS

1. Svetlin Nakov, Veselin Kolev & Co. (2019). *Fundamentals of Computer Programming with C#,* Faber Publication.

2. Mathew MacDonald. (2015). *The Complete Reference ASP .NET*, Tata McGraw - Hill.

Unit	Chapters	Pages
I	1,2	1 - 52
II	6 & 7	139- 191
III	9, 16	239 - 276 495 - 524
IV	13	373 - 420
V	15	449 - 494

REFERENCE BOOKS

1. Herbert Schildt. (2017). *The Complete Reference C#, .NET*, Tata McGraw Hill.
2. Kogent Learning Solutions. (2013). *C# 2012 Programming Covers .NET 4.5 Black Book,* Dreamtech Press.
3. Anne Boehm, Joel Murach,. (2016). *Murach's C# 2015*, Mike Murach & Associates Inc.
4. Denielle Otey, Michael Otey. (2008). *ADO .NET: The Complete Reference*, McGraw Hill.
5. Matthew MacDonal. (2010). *Beginning ASP .NET 4 in C#*, APRESS.

WEB RESOURCES

1. https://www.geeksforgeeks.org/introduction-to-net-framework/

2. https://www.javatpoint.com/net-framework

Course Code 24UCAC52	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	1	2	2	2	-	1	-	-
CO2	3	3	2	2	2	2	2	2	-	-
CO3	3	3	3	3	2	2	3	3	1	1
CO4	3	3	2	2	3	3	2	1	1	1
CO5	3	3	1	3	3	3	3	1	1	1

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

Mrs. J. Porkodi   Dr. B. Subashini

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

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B.C.A.
(2024-2025 onwards)

Semester V		Hours/Week: 5	
Core Course – 11 Practical - 5	**ASP.NET PROGRAMMING PRACTICAL**	Credits: 3	
Course Code **24UCAC51P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : outline the basic concepts of needed for the given problem. [K2]

CO2 : write programs using ASP. Net Web forms, rich controls and ADO .Net [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 : apply the necessary modifications and justify the desired result. [K3]

1. Create an exposure of Web applications and tools

2. Implement the HTML Controls

3. Implement the Server Controls

4. Web application using Web controls

5. Web application using List controls

6. Web Page design using Rich control

7. Validate user input using Validation controls

8. Working with File concepts

9. Web application using Data Controls

10. Data binding with Web controls

11. Data binding with Data Controls

12. Database application to perform insert, update and delete operations

13. Database application using Data Controls to perform insert, delete, edit, paging and sorting operation

14. Implement the Xml classes

15. Implement Authentication – Authorization

16. Ticket reservation using ASP.NET controls

17. Online examination using ASP.NET controls

Course Code 24UCAC51P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	1	2	2	2	-	1	-	-
CO2	3	3	2	2	2	2	2	2	1	1
CO3	3	3	3	3	3	2	3	3	1	1
CO4	3	3	2	2	3	3	2	1	1	1
CO5	3	3	1	3	3	3	3	1	1	1

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

Mrs. J. Porkodi   Dr. B. Subashini

Head of the Department   **Course Designer**

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B.C.A.
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Semester V		Hours/Week: 1
Core Course – 12 Project	**PROJECT**	Credits: 1
Course Code **24UCAC53PR**		Internal 100

COURSE OUTCOMES

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

CO1 : explore on planning, analysis and design of a project. [K2]

CO2 : identify methodologies and professional way of documentation and communication. [K3]

CO3 : determine the key stages in development of the project. [K3]

CO4 : execute the project using test data. [K3]

CO5 : analyse the developed project with the needs of the Industry. [K4]

Students are expected to select a project in the field of Computer Applications. Projects can be done individually or in a group of two students. Minimum pages for project report should be 20 pages. Two typed copies of the report on the completed project will be submitted to the Controller of Examination through the Head of the department in the month of November during V semester. Evaluation will be done internally.

Project work & Report - 60 marks

Presentation & Viva-voce - 40 marks

Course Code 24UCAC53PR	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	2	2	2	-	-	1	2
CO2	3	2	3	2	-	2	-	2	2	2
CO3	2	-	-	2	-	-	-	2	2	2
CO4	3	2	1	2	2	-	-	-	-	2
CO5	2	3	1	-	-	-	3	1	2	2

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

Mrs. J. Porkodi   Mrs. J. Porkodi

Head of the Department   **Course Designer**

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Semester V		Hours/Week: 5	
Elective Course DSEC - 1	**RDBMS WITH PL/SQL**	Credits: 4	
Course Code **24UCAE51**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : recite Database Management system fundamentals and outline the concepts in database design and SQL commands. [K1]

CO2 : extend the relational algebra operations, relational calculus functions and PL/SQL elements [K2]

CO3 : associate normal forms, data definition control statements and exception handling statements [K2]

CO4 : Simulate the concepts of ER diagram relations with real world problems and apply the concepts of procedure and functions [K3]

CO5 : make use of PL/SQL statements, to develop program for unsolved problems [K3]

UNIT I

Overview of Database Management System: Introduction - Data and Information – Database – Database Management System–Objectives of DBMS -Evolution of Database Management Systems- Classification of Database Management System - File-Based System - Drawbacks of File-Based System- DBMS approach – Advantages of DBMS. **Entity Relationship Model:** Introduction –The Building Blocks of an Entity–Relationship Diagram - Classification of Entity Sets - Attribute Classification - Relationship Degree - Relationship Classification.   (15 Hours)

UNIT II

Relational Model: Introduction - CODD's Rule-Relational Data Model-Concept of Key-Relational Integrity– Relational Algebra - Relational Algebra Operations–Advantages and limitations of Relational Algebra –Relational Calculus– Domain Relational Calculus - QBE.

(15 Hours)

UNIT III

Structured Query Language: Introduction- History of SQL Standard SQL - Commands in SQL- Data types in SQL- Data Definition Language - Selection Operation- Aggregate Functions- Data Manipulation Language - Table Modification Commands- Table Truncation. - Imposition of Constraints - Join Operation- Set Operations. (15 Hours)

UNIT IV

PL/SQL: Introduction - Structure of PL/SQL- PL/SQL Language Elements - Data Types - Operators Precedence - Control Structure - Steps to Create a PL/SQL Program - Iterative Control - Cursors - Steps to Create a Cursor - Procedure – Function – Packages–Exceptional Handling-Triggers. (15 Hours)

UNIT V

Database Design: Introduction - Objectives of Database Design- Database Design Tools-Redundancy and Data Anomaly - Functional Dependency - Functional Dependency Inference Rules - Closure of Set of Functional Dependencies- Normalization.- Steps in Normalization - Unmoral Form to First Normal Form - First Normal Form to Second Normal Form - Second Normal Form to Third Normal Form - Boyce–Codd Normal Form (BCNF) .- Fourth and Fifth Normal Forms- Denormalization**.** (15 Hours)

TEXT BOOK

S.Sumathi, S.Esakkirajan. (2007). *Fundamentals of Relational Database Management System*, Springer International Edition.

Unit	Chapters	Sections
I	1,2	1.1-1.11,2.1-2.6
II	3	3.1-3.12
III	4	4.1-4.14
IV	5	5.1-5.17
V	6	6.1-6.15

REFERENCE BOOKS

1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan. (2019). *Database System Concepts*, 7th Edition, McGraw Hill.

2. Alexis Leon & Mathews Leon. (2014). *Fundamentals of DBMS,* 2ndEdition, Vijay Nicole Publications.

WEB RESOURCES

1. NPTEL&MOO, Relational Database Management Systems

2. https://nptel.ac.in/courses/106106093/

3. https://nptel.ac.in/courses/106106095/

Course Code 24UCAE51	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	2	1	2	2	2	-	1	-	-
CO2	2	3	2	2	2	2	2	2	-	-
CO3	3	2	3	3	2	2	3	3	1	1
CO4	3	3	2	2	3	3	2	1	1	1
CO5	3	3	1	2	3	3	3	1	1	1

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

Mrs. J. Porkodi   **Mrs. V.Queen Jemila**

Head of the Department   Course Designer

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Semester V		Hours/Week: 5	
Elective Course DSEC - 1	**IMAGE PROCESSING**	Credits: 4	
Course Code **24UCAE52**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : learn about digital images, 2D systems, image transformation, enhancement, segmentation and compression schemes. [K1]

CO2 : understand elements of Image processing, system, 2D convolution, 2D Image transform, Filters, Region approach and Images edges [K2]

CO3 : recognize the operations of image arithmetic, image segmentation techniques, edge detection methods and image compression schemes [K2]

CO4 : illustrate image enhancement in spatial domain and frequency domain, clustering techniques, segmentation based on thresholding and image compression [K3]

CO5 : apply Histogram manipulation, Huffman coding, Arithmetic coding in real time applications. [K3]

UNIT I

Digital Image Fundamentals: Introduction – Digital Image representation – Neighbours of a Pixel – Classification of Digital Images – Image types - Elements of an Image Processing system: Image Sensor and Acquisition, CCD Sensor, Digital Camera, Camcorder, Ultrasound, Image storage mechanisms and Image display – Image File formats - Applications of Digital Image Processing. **2D Systems:** Introduction - Classification of 2D Systems – 2D Convolution– 2D Convolution through Graphical Method -2D Convolution through Matrix Analysis.

(18 Hours)

UNIT II

2D Image transforms: Introduction - Need for Transform - Walsh transform - Hadamard transform- Haar transform- Discrete Cosine Transform. (12 Hours)

UNIT III

Image Enhancement: Image enhancement in spatial domain − enhancement through point operation − types of point operation − Histogram manipulation − Linear gray level transformation − Nonlinear gray level transformation: Thresholding, Gray level slicing. Local or Neighbourhood operation: Spatial filtering, Linear filtering, Mean filter and Median filter - Image enhancement in the frequency domain - low pass filtering in frequency domain − Image arithmetic: Image addition, Image subtraction, Image multiplication and Image division.

(15 Hours)

UNIT IV

Image segmentation: Classification of Image segmentation techniques - Region approach to Image segmentation: Region growing, Region splitting and Region merging − Clustering techniques: Hierarchical clustering, Partitional clustering and K-means clustering - Segmentation based on thresholding: Global thresholding, Adaptive thresholding and Histogram based threshold selection - Classification of Edges: Step edge, Line edge, Ramp edge and Roof edge − Edge detection: Roberts kernel, Prewitt kernel, Sobel kernel and Canny edge detector.

(15 Hours)

UNIT V

Image Compression: Need for compression -Redundancy- Classification of redundancy in images − Image Compression scheme − Classification of Image Compression schemes - Huffman coding- Arithmetic coding- Dictionary based compression - Transform based compression. (15 Hours)

TEXTBOOKS

1. S Jayaraman, S Esakkirajan, T Veerakumar. (2015). *Digital Image Processing*, Tata McGraw Hill.
2. Gonzalez Rafel C. (2009). *Digital Image Processing*, Pearson Education.

Unit	Chapters	Sections
I	1 2 3	1.1, 1.6, 1.7, 1.8(1.8.1, 1.8.2, 1.8.10 to 1.8.14, 1.9, 1.10 2.1, 2.6, 2.7 3.2, 3.4
II	4	4.1, 4.2, 4.8, 4.9, 4.10, 4.12
III	5	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7(5.7.1, 5.7.2), 5.8(5.8.1 to 5.8.3), 5.9, 5.12, 5.12.1, 5.15(5.15.1 to 5.15.4)
IV	7	7.2, 7.3, 7.4.1 to 7.4.3, 7.5.1 to 7.5.3, 7.7, 7.8.3 to 7.8.5, 7.8.10.
V	9	9.1 to 9.6, 9.10 to 9.12, 9.14

REFERENCE BOOKS

1. Jain Anil K, Fundamentals of digital image processing, PHI, 1988.

2. Kenneth R Castleman, Digital image processing, Pearson Education, 2/e, 2003.

3. Pratt William K, Digital Image Processing, John Wiley, 4/e, 2007.

WEB RESOURCES

1. https://kanchiuniv.ac.in/coursematerials/Digital imageprocessing-VijayaRaghavan.pdf

   http://sdeuoc.ac.in/sites/default/files/sde_videos/DigitalImage Processing3rd ed.R.

   Gonzalez C R.Woods-ilovepdf-compressed.pdf

2. https://dl.acm.org/doi/10.5555/559707

3. https://www.ijert.org/image-processing-using-web-2-0-2

Course Code 24UCAE52	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	1	2	2	2	-	-	-	-
CO2	3	3	3	2	1	1	-	-	-	-
CO3	3	3	3	3	1	1	1	2	-	-
CO4	2	3	2	2	2	1	1	3	-	-
CO5	2	-	1	1	1	2	-	2	-	-

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

Mrs. J. Porkodi   Mrs.R.Nagajyothi

Head of the Department   **Course Designer**

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(2024-2025 onwards)

Semester V		Hours/Week: 5	
Elective Course DSEC Practical- 2	**PL/SQL PRACTICAL**	Credits: 3	
Course Code **24UCAE53P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : write SQL statements using commands. [K2]

CO2 : make use of PL/SQL exception, cursor, trigger, procedure and function. [K2]

CO3 : build and execute the codes to produce required output. [K3]

CO4 : present output effectively and prepare the record. [K3]

CO5 : design the program and justify the results. [K3]

Write SQL statements using the following

1. Data definition commands. Create, Alter and drop

2. Data Manipulation commands. Insert, Delete, Update

3. Set operations

4. Aggregate functions

5. Date functions

6. String functions

Write PL/SQL program for the following programs.

1. Programs using Conditional controls, iterative controls and sequential controls

2. Programs using exception handling

3. Programs using explicit cursors

4. Programs using implicit cursor.

5. Programs using database trigger.

6. Programs to design procedures using in, out, in out parameter

7. Programs to design procedures using functions

Course Code 24UCAE53P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	1	2	2	2	-	-	-	-
CO2	3	3	3	2	1	1	-	-	-	-
CO3	3	3	3	3	1	1	1	2	-	-
CO4	2	3	2	2	2	1	1	3	-	-
CO5	2	-	1	1	1	2	-	2	-	-

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

Mrs. J. Porkodi   Mrs. V.Queen Jemila

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

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B.C.A.
(2024-2025 onwards)

Semester V		Hours/Week: 5	
Elective Course **DSEC Practical - 2**	**IMAGE PROCESSING PRACTICAL**	Credits: 3	
Course Code **24UCAE54P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : understand the perspectives of Java to solve problems. [K2]

CO2 : learn the basics knowledge to develop programs implementing classes, methods, inheritances, interfaces, packages, multithreading, exception, applet and graphics programming and swing. [K2]

CO3 : ability to build and modify the codes to produce required output. [K3]

CO4 : Present output effectively and prepare the record. [K3]

CO5 : design the necessity test for programs with modifications and justify the results. [K3]

Write the following program using Python:

1. to perform Pixel Inspection.

2. to Inverse an Image.

3. to read an RGB image and find the Red Channel, Green Channel, Blue Channel.

4. to perform Addition and Subtraction of Pixels.

5. to compute 2D Linear Convolution.

6. to compute DCT.

7. to display the Histogram of an Image.

8. to display the Histogram Equalization of an Image.

9. to perform Brightness Enhancement.

10. to perform various Filtering on Images.

11. to perform Threshold operation.

12. to perform Edge Detection using Roberts, Prewitt, Sobel and Canny methods.

13. to compute Arithmetic and Huffman coding.

14. read an RGB image and segment it using the threshold method.

15. to perform compression.

Course Code 24UCAE54P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	1	2	2	2	-	-	-	-
CO2	3	3	3	2	1	1	-	-	-	-
CO3	3	3	3	3	1	1	1	2	-	-
CO4	2	3	2	2	2	1	1	3	-	-
CO5	2	-	1	1	1	2	-	2	-	-

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

Mrs. J. Porkodi   Mrs. R. Nagajyothi

Head of the Department   **Course Designer**

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B.C.A.
(2024-2025 onwards)

Semester V		Hours/Week: -
Internship	**INTERNSHIP**	Credit: 1
Course Code **24UCAI51**		Internal: 100 Marks

COURSE OUTCOMES

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

CO1: observe, analyze, and understand organizational processes, systems, and cultures, and identify areas for further improvement. [K2]

CO2: formulate theoretical concepts learned in the classroom to Industry based problems. [K3]

CO3: demonstrate professional skills, including team communication and work, and time management, and adhere to organizational norms and etiquette. [K3]

CO4: develop industry ready graduates and lifelong learning. [K3]

CO5: analyse problem-solving and critical thinking skills by identifying and addressing organizational challenges and problems. [K4]

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 10-15 pages must be submitted by each student after the completion of the Internship period.

❖ Internal Viva-voce examination will be conducted.

❖ Students with diverse disabilities must complete a 10 day internship programme at their preferred places.

Course Code 24UCAI51	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	3	2	2	2	3	3	2	3
CO2	3	3	3	3	3	2	3	3	2	3
CO3	3	3	2	3	3	2	2	2	2	3
CO4	3	3	3	2	3	3	2	3	2	3
CO5	3	3	3	3	3	2	2	2	2	3

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

Mrs.J.Porkodi   Mrs.V.Queen Jemila
Heads of the Department   **Course Designer**

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B.C.A.
(2024-2025 onwards)

Semester V		Hours/Week: -	
Extra Credit Course (Self-Study Course)	**DATA MINING**	Credit: 2	
Course Code **24UCAO51**		Internal 100	External -

COURSE OUTCOMES

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

CO1 : gain the knowledge about the basics of data mining, data objects, preprocessing, data warehouse, mining patterns, classification and cluster analysis concepts.

CO2 : classify data, patterns, data visualization, OLAP, mining methods, classification methods and cluster analysis methods.

CO3 : apply the data mining techniques in real time problems.

CO4 : analyze the different technology used in data mining.

CO5 : perform evaluation of pattern, classification and clustering in real time problems.

UNIT I

Introduction: Data Mining - Kinds of Data that Can Be Mined- Kinds of Patterns that Can Be Mined - Technologies Used. **Getting to Know Your Data:** Data Objects and Attribute Types – Measuring Data Similarity and Dissimilarity.

UNIT II

Data Pre-processing: Data Cleaning - Data Integration - Data Transformation and Data Discretization. **Data Warehousing and Online Analytical Processing:** Data Warehouse: Basic Concepts - Data warehouse Modelling: Data Cube and OLAP.

UNIT III

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods: Basic concepts - Frequent Item set Mining Methods - Patterns that are Interesting.

UNIT IV

Classification: Basic Concepts - Decision Tree Induction - Bayes Classification Methods – Rule Based Classification.

UNIT V

Cluster Analysis Basic Concepts and Methods: Cluster Analysis - Partitioning Methods - Hierarchical Methods.

TEXT BOOK

Jiawei Han, Micheline Kamber, Jian Pei. (2016). *Data Mining Concepts and Techniques* Third Edition, Morgan Kaufmann Publisher.

Mrs. J.Porkodi   Mrs.R. Nancy Beaulah

Head of the Department   **Course Designer**

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B.C.A.
(2024-2025 onwards)

Semester VI		Hours/Week: 6	
Core Course- 11	**COMPUTER NETWORKS**	Credits: 5	
Course Code		Internal	External
24UCAC61		25	75

COURSE OUTCOMES

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

CO1 : know the concept of Data communication and Computer networks. [K1]

CO2 : understand the concept of Wireless communication and Error detection and correction.[K2]

CO3 : compare the characteristics of Routing and Congestion control algorithms. [K2]

CO4 : illustrate the connection management in Transport Layer. [K3]

CO5 : implement routing algorithms in solving real world problems [K3]

UNIT I

Introduction: Network Hardware - Network software - reference models. **Physical Layer:** guided transmission media - wireless transmission - communication satellites – The Public Switched Telephone Network: switching – the mobile telephone system. (18 Hours)

UNIT II

The Data Link Layer: Data link layer design issues - error detection and correction - elementary data link protocols - sliding window protocols – **The Medium Access Control Sub layer:** the channel allocation problem - Multiple access protocols: ALOHA, Carrier Sense Multiple Access protocols. (18 Hours)

UNIT III

The Network Layer: Network layer design issues - routing algorithms: shortest path algorithm - flooding - distance vector routing - link state routing - hierarchical routing - broadcast routing - multicast routing - Congestion Control Algorithms: approaches to congestion control – Traffic aware routing – admission control – traffic throttling – load shedding – The Network layer in the Internet: IP version 4 Protocol - IP Address – IP version 6 - Internet control protocols.

(18 Hours)

UNIT IV

  The Transport Layer: Transport layer service: services provided to upper layers - transport service primitives - Elements of transport protocols: addressing – connection establishment - connection release - error control and flow control – The Internet Transport Protocols: UDP: Introduction to UDP - Internet Transport Protocols: TCP : Introduction to TCP - the TCP protocol - TCP segment header - TCP connection establishment – connection release - TCP sliding window.   (18 Hours)

UNIT V

  The Application Layer: DNS: The DNS Name space – Domain resource records – Name servers - Electronic Mail: Architecture and services – The user agent – Message formats – Message Transfer – Final Delivery.   (18 Hours)

TEXT BOOK

1. Andrew S.Tanenbaum & David J.Wetherall. (2011). *Computer Networks*, 5th Edition, Prentice Hall.

Unit	Chapter	Section
I	1, 2	1.2 – 1.4, 2.2 – 2.4, 2.6.5, 2.7
II	3, 4	3.1 – 3.4, 4.1, 4.2.1, 4.2.2
III	5	5.1, 5.2.2 – 5.2.8, 5.3.1 – 5.3.5, 5.6.1 – 5.6.4
IV	6	6.1.1, 6.1.2, 6.2.1 – 6.2.4, 6.4.1, 6.5.1, 6.5.3 – 6.5.6, 6.5.8
V	7	7.1, 7.2

REFERENCE BOOKS

1. B.A.Forouzan. (2017). *Data Communications and Networking*, 4th Edition, Tata McGraw Hill.

2. F. Hal sall, Data Communications. (2008). *Computer Networks and Open Systems*, Pearson Education.

3. D. Bertsekas and R. Gallagher. (2008). *Data Networks*, 2nd Edition, PHI.

4. Lamarca. (2002). *Communication Networks*, Tata McGraw Hill.

Web Resources:

1. https://en.wikipedia.org/wiki/Computer_network

2. https://citationsy.com/styles/computer-networks

Course Code 24UCAC61	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	1	2	2	2	-	1	-	-
CO2	3	3	1	1	2	2	2	2	-	-
CO3	3	3	2	3	2	2	3	3	1	1
CO4	3	3	2	2	3	2	2	1	1	1
CO5	3	3	1	1	3	2	3	1	-	-

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

Mrs. J. Porkodi   Mrs. V. Queen Jemila

Head of the Department   **Course Designer**

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B.C.A.
(2024-2025 onwards)

Semester VI		Hours/Week: 6	
Core Course- 14	**DATA ANALYTICS USING R PROGRAMMING**	Credits: 5	
Course Code **24UCAC62**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : understand the R Data Structures Vector, Character String, Matrices, List, Data Frames and Classes. [K1]

CO2 : understanding the basic programming constructs in R Programming. [K2]

CO3 : apply R Programming data structures Vector, Lists, Matrices and Data Frames. [K2]

CO4 : develop R Programming with input/output files. [K3]

CO5 : interpret data visualization represented by using R. [K3]

UNIT I

Getting Started: How to Run R - A First R Session - Introduction to Functions - Preview of Some Important R Data Structures - **Vectors** : Scalars, Vectors, Arrays, and Matrices – Declarations – Recycling - Common Vector Operations - Using all() and any() - Vectorized Operations - NA and NULL Values – Filtering - A Vectorized if-then-else: The ifelse() Function - Testing Vector Equality - Vector Element Names (18 Hours)

UNIT II

Matrices and Arrays: Creating Matrices - General Matrix Operations - Applying Functions to Matrix Rows and Columns - Adding and Deleting Matrix Rows and Columns - More on the Vector/Matrix Distinction - Avoiding Unintended Dimension Reduction - Naming Matrix Rows and Columns - Higher-Dimensional Arrays – **Lists:** Creating Lists - General List Operations - Accessing List Components and Values - Applying Functions to Lists - Recursive Lists - **Data Frames:** Creating Data Frames - Other Matrix-Like Operations - Merging Data Frames - Applying Functions to Data Frames. (18 Hours)

UNIT III

Factors and Tables: Factors and Levels - Common Functions Used with Factors - Working with Tables - Other Factor- and Table-Related Functions - **R Programming Structures:** Control Statements - Arithmetic and Boolean Operators and Values - Default Values for Arguments - Return Values - Functions Are Objects - Environment and Scope Issues - No Pointers in R – Recursion.   (18 Hours)

UNIT IV

Doing Math and Simulations in R: Math Functions - Functions for Statistical Distributions – Sorting - Set Operations - **Object-Oriented Programming:** S3 Classes - S3 Generic Functions - Writing S3 Classes - Using Inheritance - S4 Classes - Writing S4 Classes - Implementing a Generic Function on an S4 Class -   S3 Versus S4 – **Input / Output:** Accessing the Keyboard and Monitor - Reading and Writing Files - Reading a Data Frame or Matrix from a File - Reading Text Files - Introduction to Connections - Writing to a File - Getting File and Directory Information.   (18 Hours)

UNIT V

String Manipulation: An Overview of String-Manipulation Functions – Regular Expressions - Use of String Utilities in the edtdbg Debugging Tool - **Graphics:** Creating Graphs - Customizing Graphs - Saving Graphs to Files - Creating Three-Dimensional Plots.

                                   (18 Hours)

TEXT BOOK

1. Norman Matloff. (2011). *The Art of R Programming - A Tour of Statistical Software Design*, William Pollock.

Unit	Chapters	Sections
I	1	1.1 - 1.4
	2	2.1 - 2.11
II	3	3.1 - 3.8
	4	4.1 - 4.5
	5	5.1 - 5.4
III	6	6.1 - 6.4
	7	7.1 - 7.7, 7.9
IV	8	8.1 - 8.5
	9	9.1: 9.1.1, 9.1.4, 9.1.5, 9.2, 9.3
	10	10.1, 10.2: 10.2.1 - 10.2.3, 10.2.6, 10.2.7
V	11	11.1 - 11.3
	12	12.1 - 12.4

REFERENCES BOOKS

1. Garrett Grolemund, Hadley Wickham. (2014). *Hands-On Programming with R: Write Your Own Functions and Simulations*, 1st Edition.
2. Venables , W.N.,and Ripley. (2000). *S programming,* Springer.
3. Roger D. Peng. (2015). *R Programming for Data Science*.

Course Code 24UCAC62	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	3	3	2	2	1	-	-
CO2	3	3	-	1	1	-	-	-	2	-
CO3	2	3	2	3	3	2	2	2	-	1
CO4	3	2	-	2	2	2	2	-	1	-
CO5	2	1	2	3	3	3	3	1	1	-

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

Mrs. J. Porkodi   Dr. N. Santhi

Head of the Department   Course Designer

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VIRUDHUNAGAR

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B.C.A.
(2024-2025 onwards)

Semester VI		Hours/Week: 6	
Core Course – 15 Practical – 6	**R PROGRAMMING PRACTICAL**	Credits: 3	
Course Code **24UCAC61P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : understand the basic programming constructs in R Programming. [K2]

CO2 : know working with input and output with files in R Programming. [K2]

CO3 : make use of R Programming data structures – lists, matrices, vectors and data frames. [K3]

CO4 : illustrate various computing strategies for R Programming-based solutions to real world problems. [K3]

CO5 : develop the skills of designing graphical-user interfaces (GUI) in R Programming. [K3]

Write the following programs in R

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.

2. Program to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.

3. Program to find list of even numbers from 1to n using R-Loops.

4. Create a function to print squares of numbers in sequence.

5. Program to join columns and rows in a data frame using cbind() and rbind() in R.

6. Implement different String Manipulation functions in R.

7. Implement Lists data structure in R

8. Implement Vectors data structure in R

9. Implement Data Frames in R.

10. Program to find factorial of the given number using recursive function

11. Program to count the number of even and odd numbers from array of N numbers.

12. Program to read a CSV file and analyse the data in the file in R.

13. Create pie chart and bar chart using R.

14. Create a data set and do statistical analysis on the data using R.

Course Code 24UCAC61P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	3	2	2	2	1	-	-
CO2	3	3	-	1	1	-	-	-	2	-
CO3	3	2	2	3	3	2	2	2	-	1
CO4	2	2	-	2	2	2	2	-	1	-
CO5	1	1	2	3	3	3	3	1	1	-

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

Mrs. J.Porkodi   Dr.N. Santhi

Head of the Department   **Course Designer**

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B.C.A.

(2024-2025 onwards)

Semester VI		Hours/Week: 5	
Elective Course DSEC - 3	**MOBILE APPLICATION DEVELOPMENT**	Credits: 4	
Course Code **24UCAE61**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : define the concepts of Android programming basics, Activities, Fragments, Intents, UI, Views, inserting pictures and data persistence. [K1]

CO2 : summarize about Android basics, Activities, Fragments, Intents, UI, Views, apps with pictures and data storage in memory card, Databases. [K2]

CO3 : outline the needed views to design the UI and use Activities, Fragments, Intents, picture insertion, menu, Data storage in Android Apps. [K2]

CO4 : identify the elements needed for the UI designing such as views, images and combine the concepts such as activities, fragment, Intent and data persistence. [K3]

CO5 : develop simple Android Apps using Android basics, Activities, Fragments, Intents, UI, Views, pictures and data persistence. [K3]

UNIT I

Getting Started with Android Programming: What is Android - Obtaining the Required Tools – Activities, Fragments and Intents: Understanding Activities - Linking Activities using Intents – Fragments – Calling Built-in Applications using Intents - Displaying Notifications.

(15 Hours)

UNIT II

Getting to know the Android User Interface: Understanding the Components of a screen - Adopting to Display Orientation - Managing Changes to Screen Orientation – Utilizing the Action Bar – Creating the User Interface Programmatically - Listing for UI Notifications.

(15 Hours)

UNIT III

Designing your screen interface using Views: Using Basic Views – Using Picker Views – Using List Views to display Long Lists – Understanding Specialized Fragments.

(15 Hours)

UNIT IV

Displaying Picture and Menus with Views: Using Image Views to display pictures - Using Menu with Views - Some Additional Views. (15 Hours)

UNIT V

Data Persistence: Saving and Loading User Preferences - Persisting Data to Files - Creating and using Databases. (15 Hours)

TEXT BOOK

WeiMeng Le. (2012). *Beginning Android Application Development*, Wrox Publications (John Wiley, New York)

Unit	Chapters	Pages
I	1 & 2	1- 104
II	3	105 - 158
III	4	159- 218
IV	5	219 - 250
V	6	251 - 292

REFERENCE BOOKS

1. Ed Burnette. (2010). *Hello Android: Introducing Google's Mobile Development Platform*, 3rd Edition, The Pragmatic Publishers.

2. Reto Meier. (2012). *Professional Android 4 Application Development*, Wrox Publications (John Wiley, NewYork).

WEB RESOURCES

1. https://www.tutorialspoint.com/mobile_development_tutorials.htm

2. https://www.tutorialspoint.com › Android › Android – Home

Course Code 24UCAE61	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	2	2	2	-	-	-	-	-	-	-
CO2	2	2	2	2	2	-	-	-	-	-
CO3	2	2	2	2	2	1	1	2	1	-
CO4	3	2	1	3	2	1	1	2	1	-
CO5	3	3	1	-	-	-	-	3	1	1

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

Mrs. J. Porkodi   Dr. B. Subashini

Head of the Department   **Course Designer**

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B.C.A.
(2024-2025 onwards)

Semester VI	**SOFTWARE TESTING**	Hours/Week: 5	
Elective Course DSEC – 3		Credits: 4	
Course Code **24UCAE62**		Internal 25	External 75

COURSE OUTCOMES

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

CO1	:	recall the fundamental principles of software testing, including debugging, bug types, flow graphs, data flow strategies, and logic-based testing. [K1]
CO2	:	identify key testing techniques such as path testing, transaction flow testing, domain testing, syntax testing, and state transition testing. [K2]
CO3	:	explain the impact of software testing on productivity and quality, analyzing different testing models, structural metrics, and decision tables.[K2]
CO4	:	interpret the role of testing in software development by understanding path products, interface testing, and state graph transitions. [K3]
CO5	:	apply various software testing strategies, including flow-based, data-driven, and logic-based techniques, to enhance software reliability and performance. [K3]

UNIT I

Introduction: Purpose – Productivity and Quality in Software – Testing vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.   (15 Hours)

UNIT II

Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction Flow Testing Techniques.   (15 Hours)

UNIT III

Data Flow Testing Strategies – Domain Testing: Domains and Paths – Domains and Interface Testing.   (15 Hours)

UNIT IV

Linguistic – Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases. (15 Hours)

UNIT V

Logic Based Testing–Decision Tables – Transition Testing States, State Graph, State Testing. (15 Hours)

TEXT BOOK

B. Beizer, Software Testing Techniques, II Edition, DreamTech India, New Delhi, 2003.

Unit	Chapters
I	1,2
II	3,4
III	5,6
IV	7,8,9
V	10,11

REFERENCES BOOKS

1. I.Burnstein. (2003). *Practical Software Testing*, Springer International Edition.

2. E.Kit. (1995). *Software Testing in the Real World: Improving the Process*, Pearson Education, Delhi.

3. R.Rajani and P.P.Oak. (2004). *Software Testing*, Tata Mcgraw Hill, New Delhi.

WEB RESOURCES

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

2. https://www.guru99.com/software-testing.html

Course Code 24UCAE62	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	3	3	3	3	2	1	1
CO2	3	3	2	2	2	3	2	2	1	1
CO3	3	3	2	2	3	2	2	3	2	1
CO4	3	3	3	3	2	2	2	2	2	1
CO5	3	3	2	3	3	3	3	2	2	1

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

Mrs. J. Porkodi   Dr. K.S.Jeyalakshmi

Head of the Department   **Course Designer**

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.C.A.
(2024-2025 onwards)

Semester VI		Hours/Week: 5	
Elective Course DSEC Practical – 4	**MOBILE APPLICATION DEVELOPMENT PRACTICAL**	Credits: 3	
Course Code **24UCAE63P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : identify the packages, classes and methods needed for the problem. [K2]

CO2 : make use of views, menu, and images to design UI and write programs using activities, fragment and intent and data persistence. [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 : construct the UI design, activities in App and deduce the answers for any queries raised. [K3]

CO5 : reconstruct the program to adapt the necessary modifications and justify the desired result. [K3]

1. Create an App for String Manipulation using Radio Button view.

2. Create an App to list text suggestions using Auto Complete Text View.

3. Create an App to display progress value of seek bar.

4. Create an App to display star rating using Rating Bar.

5. Design an App for Image Gallery using Button View.

6. Design an App for Image Transition Effect.

7. Create an App to fill a shape using Gradient color.

8. Create an App for NCR calculation.

9. Create an App for Fibonacci Series

10. Create an App to implement different types of animation using XML.

11. Changing Background and Text Color of a Text View.

12. Create an App to display Date Picker Dialog.

13. Create an App to display Time Picker Dialog

14. Create an App for Menu creation.

15. Create an App to display notifications.

16. Create an App to display Alert Dialog.

17. Create Applications using SQLite database.

Course Code 24UCAE63P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	2	2	-	-	2	-	-	-	-
CO2	3	2	2	2	2	2	-	-	-	1
CO3	2	2	1	3	2	1	1	2	-	1
CO4	2	-	1	2	-	1	1	2	1	-
CO5	-	2	1	-	-	1	-	3	1	-

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

Mrs. J. Porkodi   Dr. B. Subashini

Head of the Department   **Course Designer**

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B.C.A.
(2024-2025 onwards)

Semester VI		Hours/Week: 5	
Elective Course DSEC Practical – 4	**SOFTWARE TESTING PRACTICAL**	Credits: 3	
Course Code **24UCAE64P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1 : construct and test sample programs using various testing techniques while learning effective test case design. [K2]

CO2 : identify fault cases in a program by validating logic and analyzing data before deployment. [K2]

CO3 : discover and apply a range of software testing techniques and strategies for real-time projects. [K3]

CO4 : develop basic path testing cases and procedures to enhance the verification process. [K3]

CO5 : analyze different types of test cases to address real-world IT challenges effectively. [K3]

1. Design and develop a program in a language of your choice to solve the triangle problem defined as follows:

   a. Accept three integers which are supposed to be the three sides of triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all.

   b. Derive test cases for your program based on decision-table approach, execute the test cases and discuss the results.

2. Decision table approach for the above triangle solving problem.

3. Boundary value analysis program for the above design plan.

4. Equivalence class partitioning program for the above design plan
    a. Design and develop code and run the program in nay suitable language to solve the commission problem.
    b. Analyze it from the perspective of boundary value, derive test cases, execute these test cases and discuss the test results.
5. Dataflow testing for the commission calculation for the above design and analyze problem.
6. Equivalence Class partitioning test cases for the above design and analyze.
7. Decision Table for Commission Problem.
8. Binary Search - Path Testing.
9. Quick Sort-Path Testing.
10. Boundary Value Analysis test cases for Next Date function.
11. Equivalence class test cases for Next Date function

Course Code 24UCAE64P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	2	2	-	-	2	-	-	-	-
CO2	3	2	2	2	2	2	-	-	-	1
CO3	2	2	1	3	2	1	1	2	-	1
CO4	2	-	1	2	-	1	1	2	1	-
CO5	-	2	1	-	-	1	-	3	1	-

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

Mrs. J. Porkodi   Dr. K. S. Jeyalakshmi

Head of the Department   **Course Designer**

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(2024-2025 onwards)

Semester VI		Hours/Week: 2	
SEC – 7	**BIOMETRICS**	Credits: 2	
Course Code **24UCAS61**		Internal 25	External 75

COURSE OUTCOMES

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

CO1	:	recall fundamental biometric concepts, including types of biometric traits, general architecture, performance measures, and their role in authentication. [K1]
CO2	:	identify key biometric technologies such as face, iris, and retina recognition, along with privacy concerns, watermarking techniques, and emerging trends.[K1]
CO3	:	explain the design principles of biometric systems, comparing recognition methods, data security enhancements, and privacy protection strategies. [K2]
CO4	:	analyze various biometric authentication techniques, performance evaluation methods, and their applications in enterprise and border security. [K2]
CO5	:	apply biometric technologies, including face and iris recognition, watermarking, and RFID, to enhance security and identity verification in real-world scenarios. [K3]

UNIT I

Introduction: What is Biometrics, History, Types of biometric Traits, General architecture of biometric systems, Basic working of biometric matching, Biometric system error and performance measures, Design of biometric system, Applications of biometrics, Biometrics versus traditional authentication methods. (6 Hours)

UNIT II

Face Biometrics: Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences,

Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages.

(6 Hours)

UNIT III

Retina and Iris Biometrics: Introduction, Performance of Biometrics, Design of Retina Biometrics, Design of Iris Recognition System, Iris Segmentation Method , Determination of Iris Region, Determination of Iris Region, Applications of Iris Biometrics, Advantages and Disadvantages. **Privacy Enhancement Using Biometrics:** Introduction, Privacy Concerns Associated with Biometric Deployments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics.   (6 Hours)

UNIT IV

Watermarking Techniques: Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking Techniques.   (6 Hours)

UNIT V

Scope and Future: Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics, Biometrics and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometrics, Radio Frequency Identification (RFID) Biometrics, DNA Biometrics, Comparative Study of Various Biometric Techniques.   (6 Hours)

TEXT BOOK

1. G.R Sinha and Sandeep B. Patil. (2013). *Biometrics: Concepts and Applications*, Wiley.

Unit	Chapters
I	1
II	3
III	4, 7
IV	9.1 - 9.10
V	10

REFERENCES BOOKS

1. Ruud M. Bolle , Sharath Pankanti, Nalinik Ratha, Andrew W.Senior, Jonathan H. Connell. (2009). *Guide to Biometrics*, Springer.

2. Anil k. Jain, Arun A. Ross, Karthik Nandakumar. (2004). *Introduction to Biometrics* , Pearson publication.

3. Anil K. Jain, Patrick Flynn, Arun A.Ross. *Hand book of Biometrics*

WEB RESOURCES

1. https://www.tutorialspoint.com/biometrics/index.htm
2. https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/inspired/biometrics

Course Code 24UCAS61	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	3	3	3	3	2	1	1
CO2	3	3	2	2	2	3	2	2	1	1
CO3	3	3	2	2	3	2	2	3	2	1
CO4	3	3	3	3	2	2	2	2	2	1
CO5	3	3	2	3	3	3	3	2	2	1

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

Mrs. J. Porkodi   Dr. K.S.Jeyalakshmi

Head of the Department   **Course Designer**