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)
(2023-2024 onwards)

UG PROGRAMMES

Name of the Course	Course Code	Semester	Department
Introduction to Tourism	23UHIN11	I	History(EM)
Indian Constitution	23UHIN21	II	History(EM)
சுற்றுலா ஓர் அறிமுகம்	23UHIN11	I	History (TM)
இந்திய அரசியலமமப்பு	23UHIN21	II	History(TM)
Popular Literature and Culture	23UENN11	I	English
English for Professions	23UENN21	II	
பேச்சுக்கலைத்திறன்	23UTAN11	I	Tamil
பயன்முறைத் தமிழ்	23UTAN21	II	
Practical Banking Basic Accounting Principles	23UCON11 23UCON22	I II	Commerce (Aided)

Financial Literacy-I Financial Literacy -II	23UCON12 23UCON21	I II	Commerce (SF)
Self-Employment and Startup Business Fundamentals of Marketing	23UCCN11 23UCCN21	I II	Commerce CA (SF)
Women Protection Laws	23UCPN11	I	Commerce (Professional Accounting)
Basic Labour Laws	23UCPN21	II	
Basics of Event Management	23UBAN11	I	Business Administration
Business Management	23UBAN21	II	
Quantitative Aptitude I	23UMTN11	I	Mathematics
Quantitative Aptitude II	23UMTN21	II	
Physics for Everyday life -I	23UPHN11	I	Physics
Physics for Everyday life -II	23UPHN21	II	
Food Chemistry	23UCHN11	I	Chemistry
Drugs and Natural Products	23UCHN21	II	
Ornamental fish farming and Management	23UZYN11	I	Zoology
Biocomposting for Entrepreneurship	23UZYN21	II	
Foundations of Baking and Confectionery	23UHSN11	I	Home Science – Nutrition and Dietetics
Basic Nutrition and Dietetics	23UHSN21	II	
Nutrition and Health	23UBCN11	I	Biochemistry
Life Style Diseases	23UBCN21	II	
Social and Preventive Medicine	23UMBN11	I	Microbiology
Nutrition & Health Hygiene	23UMBN21	II	
Herbal Medicine	23UBON11	I	Biotechnology
Organic farming and Health Management	23UBON21	II	
Basics of Fashion	23UCFN11	I	Costume Design And Fashion
Interior Designing	23UCFN21	II	
Office Automation	23UCSN11	I	Computer Science
Introduction to Internet and HTML 5	23UCSN21	II	
Office Automation	23UITN11	I	Information Technology
Introduction to HTML	23UITN21	II	
Introduction to HTML	23UCAN11	I	Computer Applications
Fundamentals of Computers	23UCAN21	II	
Introduction to HTML	23UGDN11	I	Computer Applications - Graphic Design
Fundamentals of Computers	23UGDN21	II	
Organic Farming	23UBYN11	I	Botany
Nursery and Landscaping	23UBYN12		
Mushroom Cultivation	23UBYN21	II	
Medicinal Botany	23UBYN22		
Cadet Corps for Career Development I	23UNCN11	I	National Cadet Corps
Cadet Corps for Career Development II	23UNCN21	II	

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

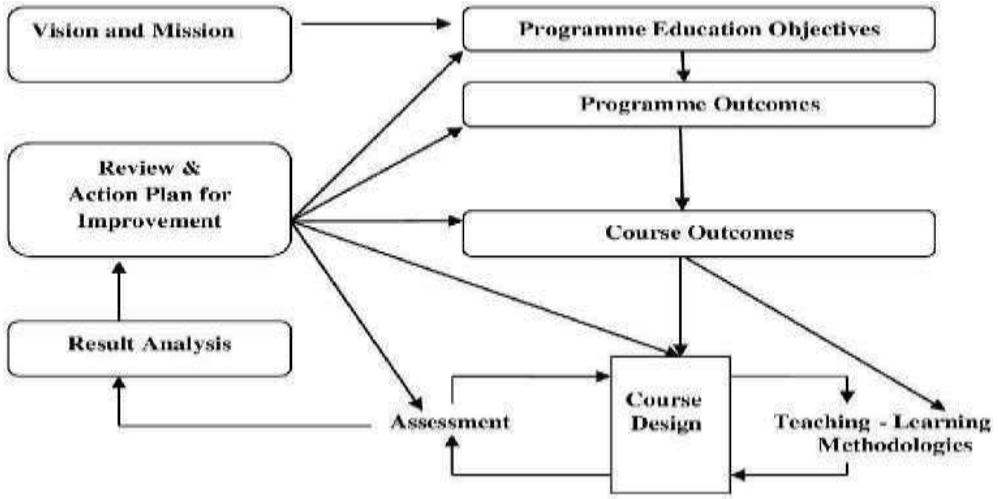
PO-PEO Mapping Matrix

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	-	-	✓

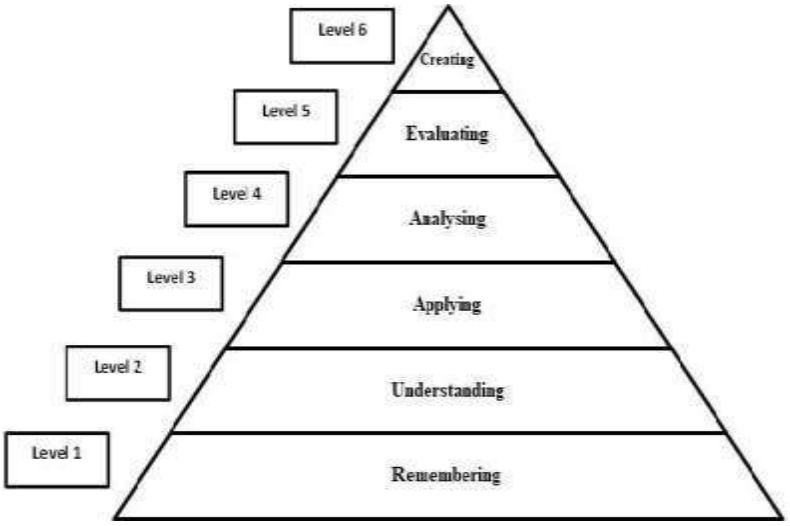
B.1.4 Course Outcomes (COs)

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
		Field Project/Internship
		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

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

*The total marks obtained in the 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 (Multiple Choice Questions - K2 Level)	:	25
Total	**:**	**75**

Question Pattern **Duration: 2 Hours**

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

B.2.3.2 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	6	18
B Q. No.(4)	Internal Choice – Either Or Type	1	1	12	12
Total					**30**

*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 (Multiple Choice Questions - K2 Level)	:	25
Total	**:**	**75**

Question Pattern **Duration: 2 Hours**

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

B.2.4 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.2.6 SELF STUDY COURSE

B.2.6.1 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.2.6 .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.2.7. 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.2.8 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 for all the Courses.
  - 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.
  - Pass minimum for External Practical Examination is 21 marks out of 60 marks.
- **Attendance**

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

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

c) The students who have attended the classes for 59 days and less – upto 45 days (50%

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65%) can appear for the Summative Examinations only after getting special permission from the Principal.

d) The students who have attended the classes for 44 days or less (<50%) cannot appear for the Summative Examinations and have to repeat the whole semester.

- For Part V in UG Programmes, the students require 75 % of attendance to get a credit.
- For Certificate, Diploma, Advanced Diploma and Post Graduate Diploma Programmes, the students require 75% of attendance to appear for the Theory/Practical Examinations.

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 Attainment								
Direct PO Attainment in percentage								

Indirect Attainment of POs for all Courses

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

Attainments of POs for all Courses

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

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

Expected Level of Attainment for each of the Programme Outcomes

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

Level of PO Attainment

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

B.3.3 Assessment Process for PEOs

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

Target for PEO Attainment

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

Attainment of PEOs

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

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

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

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

Expected Level of Attainment for each of the Programme Educational Objectives

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

Level of PEO Attainment

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

C. PROCESS OF REDEFINING THE PROGRMME 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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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 2023-2024

Components	Semester						Total Number of Hours (Credits)
	I	II	III	IV	V	VI	
Part I : Tamil /Hindi	6 (3)	6 (3)	6 (3)	6 (3)	-	-	24 (12)
Part II : English	6 (3)	6(3)	6 (3)	6 (3)	-	-	24 (12)
Part III : Core Courses, Elective Courses & 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	-	-	-	-	-	-	10(8)
Core Course Practical	5(3)	5 (3)	5(3)	4 (3)	5 (3)	6 (3)	28(18)
Core Course Project	-	-	-	-	1 (1)	-	1 (1)
Elective Course (DSEC)	-	-	-	-	5(4)	5 (4)	10 (6)
Elective Course (DSEC Practical)	-	-	-	-	5(3)	5(3)	6(4)
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 &Internship/ Industrial Training							
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

SEMESTER V

BACHELOR OF COMPUTER APPLICATIONS

S. No	Components		Title of the Course	Course Code	Hours per week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1	Part III	Core Course-9	Operating Systems	23UCAC51	6	6	3	25	75	100
2		Core Course - 10	ASP. Net Programming	23UCAC52	6	6	3	25	75	100
3		Core Course-11 Practical - 5	ASP. Net Programming Practical	23UCAC51P	5	3	3	40	60	100
4		Core Course- 12 Project	Project	23UCAC53PR	1	1	-	100	-	100
5		Elective Course DSEC - 1	RDBMS with PL/SQL	23UCAE51	5	4	3	25	75	100
			Image Processing	23UCAE52						
6		Elective Course DSEC Practical-2	PL/SQL Practical	23UCAE53P	5	3	3	40	60	100
			Image Processing Practical	23UCAE54P						
7	Part IV		Value Education	23UGVE51	2	2	2	100	-	100
8		Self Study Course	Practice for Competitive Examinations - Online	23UGCE51	-	1	-	100	-	100
9		Internship/ Industrial Training	Internship	23UCAI51	-	1	-	100	-	100
				Total	**30**	**27**				**900**

10	Extra Credit (self Study Course)	Data Mining	23UCAO51	-	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	23UCAC61	6	5	3	25	75	100
2		Core Course – 14	Data Analytics using R Programming	23UCAC62	6	5	3	25	75	100
3		Core Course – 15 Practical - 6	R Programming Practical	23UCAC61P	6	3	3	40	60	100
4		Elective Course DSEC – 3	Mobile Application Development	23UCAE61	5	4	3	25	75	100
			Software Testing	23UCAE62						
5		Elective Course DSEC Practical - 4	Mobile Application Development Practical	23UCAE63P	5	3	3	40	60	100
			Software Testing Practical	23UCAE64P						
6		Self Study Course	Discipline Specific Quiz – Online	23UCAQ61	-	1	-	100	-	100
7	**Part IV**	SEC -7	Biometrics	23UCAS61	2	2	2	25	75	100
8	**Part V**		Extension Activities		-	1	-	100	-	100
				Total	**30**	**24**				**800**

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Semester V	**OPERATING SYSTEMS**	Hours/Week: 6	
Core Course - 9		Credits: 6	
Course Code **23UCAC51**		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). *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 23UCAC51	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
Head of the Department

Mrs. V.G. Jyothi Mani
Course Designer

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Semester V	**ASP .NET PROGRAMMING**	Hours/Week: 6	
Core Course - 10		Credits: 6	
Course Code **23UCAC52**		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, 2019.

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, 2017.

2. Kogent Learning Solutions.(2013). *C# 2012 Programming Covers .NET 4.5 Black Book,* Dreamtech Press.

3. Anne Boehm, Joel Murach, Murach's.(2016). *C# 2015*, Mike Murach & Associates Inc.

4. Denielle Otey, Michael Otey. (2008), *ADO .NET: The Complete Reference*, McGraw Hill.

5. Matthew MacDonald.(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 23UCAC52	**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 — **Head of the Department**

Dr. B. Subashini — **Course Designer**

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Semester V	**ASP.NET PROGRAMMING PRACTICAL**	Hours/Week: 5	
Core Course – 11 Practical - 5		Credits: 3	
Course Code **23UCAC51P**		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 23UCAC51P	**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)

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Semester V	**PROJECT**	Hours/Week: 1	
Core Course – 12 Project		Credits: 1	
Course Code **23UCAC53PR**		Internal 100	External -

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. [K2]
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. [K3]

Students are expected to select a project in the field of Computer Applications. Two students can do one project. 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 23UCAC53PR	**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
Head of the Department

Mrs. J. Porkodi
Course Designer

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Semester V	**RDBMS WITH PL/SQL**	Hours/Week: 5	
Elective Course DSEC - 1		Credits: 4	
Course Code **23UCAE51**		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*, *7*th 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 23UCAE51	**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
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Semester V	**IMAGE PROCESSING**	Hours/Week: 5	
Elective Course DSEC - 1		Credits: 4	
Course Code **23UCAE52**		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.(2019). *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.(1988). *Fundamentals of digital image processing*, PHI.
2. Kenneth R Castleman. (2003). *Digital image processing*, Pearson Education, 2/e.
3. Pratt William K.(2007). *Digital Image Processing*, John Wiley, 4/e.

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 23UCAE52	**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 — **Head of the Department**

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

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Semester V	**PL/SQL PRACTICAL**	Hours/Week: 5	
Elective Course DSEC Practical- 2		Credits: 3	
Course Code **23UCAE53P**		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 23UCAE53P	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)

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Mrs. V.Queen Jemila
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Semester VI	**IMAGE PROCESSING PRACTICAL**	Hours/Week: 5	
Elective Course **DSEC Practical - 2**		Credits: 3	
Course Code **23UCAE54P**		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 23UCAE54P	**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)**

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Head of the Department

Mrs. R. Nagajyothi
Course Designer

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Semester V	**INTERNSHIP**	Hours/Week: -
Internship/ Industrial Training		Credit: 1
Course Code **23UCAI51**		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 23UCAI51	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	3	3	2	3
CO2	3	3	3	3	3	2	3
CO3	3	2	3	2	2	2	3
CO4	3	3	3	2	3	2	3
CO5	3	3	3	2	2	2	3

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

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Course Designer

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Semester V	**DATA MINING**	Hours/Week: -	
Extra Credit Course (Self Study Course)		Credit: 2	
Course Code **23UCAO51**		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
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Semester VI	**COMPUTER NETWORKS**	Hours/Week: 6	
Core Course- 11		Credits: 5	
Course Code **23UCAC61**		Internal 25	External 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. (2018). *Data Communications, 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, 2002.

Web Resources:

1. https://en.wikipedia.org/wiki/Computer_network
2. https://citationsy.com/styles/computer-networks

Course Code 23UCAC61	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
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Semester VI	**DATA ANALYTICS USING R PROGRAMMING**	Hours/Week: 6	
Core Course- 14		Credits: 5	
Course Code **23UCAC62**		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 23UCAC62	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)

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Semester VI	**R PROGRAMMING PRACTICAL**	Hours/Week: 6	
Core Course – 15 Practical – 6		Credits: 3	
Course Code **23UCAC61P**		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 viceversa 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 23UCAC61P	**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 — **Head of the Department**

Dr.N. Santhi — **Course Designer**

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B.C.A.
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Semester VI	**MOBILE APPLICATION DEVELOPMENT**	Hours/Week: 5	
Elective Course DSEC - 3		Credits: 4	
Course Code **23UCAE61**		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 Lee. (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 23UCAE61	**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
Head of the Department

Dr. B. Subashini
Course Designer

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Semester VI	**SOFTWARE TESTING**	Hours/Week: 5	
Elective Course DSEC – 3		Credits: 4	
Course Code **23UCAE62**		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:

1. 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. (2013). *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 23UCAE62	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 — Head of the Department

Dr. K.S.Jeyalakshmi — Course Designer

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Semester VI	**MOBILE APPLICATION DEVELOPMENT PRACTICAL**	Hours/Week: 5	
Elective Course DSEC Practical – 4		Credits: 3	
Course Code **23UCAE63P**		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 23UCAE63P	**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)

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Semester VI	**SOFTWARE TESTING PRACTICAL**	Hours/Week: 5	
Elective Course DSEC Practical – 4		Credits: 3	
Course Code **23UCAE64P**		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 23CAE64P	**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)

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Semester VI	**BIOMETRICS**	Hours/Week: 2	
SEC – 7		Credits: 2	
Course Code **23UCAS61**		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. *Introduction to Biometrics,* Pearson publications
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 23UCAS61	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
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