V.V.VANNIAPERUMAL COLLEGE FOR WOMEN
(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
Re-accredited with 'A++' Grade (4th Cycle) by NAAC
VIRUDHUNAGAR
Quality Education with Wisdom and Values

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 அரசியலமைப்பு	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 fulfil 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 fulfil the Vision and Mission of the Department offering the Programme.

Vision of the Department of Computer Science

The Department of Computer Science is envisioned to create industry ready Computer Science students with ardour for personal growth.

Mission of the Department of Computer Science

To create an environment conducive for transforming rural women students into eminent students prepared for a globalized technological era and to instil in them a passion to strive for perpetual personal uplift.

Programme Educational Objectives (PEOs) of B.Sc. Computer Science

PEO1	Students gain knowledge and expertise in advanced domains of Computer Science like website design, mobile apps development and data analytics.
PEO2	The rural women students will emerge as eminent software professionals with team building capacity and leadership quality to suit the modern software industry.
PEO3	The students imbibe moral values and professional ethics to shape themselves as skilled persons to work as an individual with topical updates and as a team to contribute towards the need of industry and society.

Key Components of Mission Statement	**P**rogramme **E**ducational **O**bjectives (**PEOs**)		
	PEO1	**PEO2**	**PEO3**
transforming rural women students		√	
eminent students	√	√	√
prepared for a globalized technological era	√	√	
a passion to strive for perpetual personal uplift			√

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.

PROGRAMME SPECIFIC OUTCOMES

On completion of B.Sc. Computer Science programme, the students will be able to

PO1 - *Disciplinary Knowledge*

PSO 1.a: apply principles, methods and techniques of various domains of Computer Science and courses related to Computer Science to a wide range of applications.

PSO 1.b: use modern software development tools, packages and platforms.

PO2 – *Communication Skills*

PSO 2.a: give and receive clear instructions, write effectual reports, design documentation and make remarkable presentations on concepts related to Computer Science.

PSO 2.b: express complex technical ideas effectively to peers, other assemblage like IT community and the entire society.

PO3 - *Scientific Reasoning and Problem Solving*

PSO 3: design and develop computer programs using programming languages efficiently, in the areas related to database management, mobile applications, operating systems and web design.

PO4 - *Critical Thinking and Analytical Reasoning*

PSO 4: analyse real world problems, identify and formulate the computing requirements appropriate to give efficient and constructive solutions in different research fields of Computer Science and for environmental sustainability.

PO5 - *Digital Literacy, Self - directed and Lifelong Learning*

PSO 5.a: create high quality e-content for demonstrating complex concepts ; pursue the appropriate Massive Open Online Courses.

PSO 5.b: adapt to an ever-changing technological landscape either by pursuing higher studies and engaging in independent and life-long learning or use their potential in their career or entrepreneurial endeavours.

PO6 - *Cooperation/Team Work and Multi-Cultural Competence*

PSO 6: demonstrate the knowledge of technological and management principles to work as a member or leader, with multicultural competence in diverse teams of software projects.

PO7 - *Moral and Ethical Awareness*

PSO 7: develop innovative applications as an employee of a company or an entrepreneur, employing contemporary technologies adhering to ethical, security and legal issues of Internet and Cyber systems.

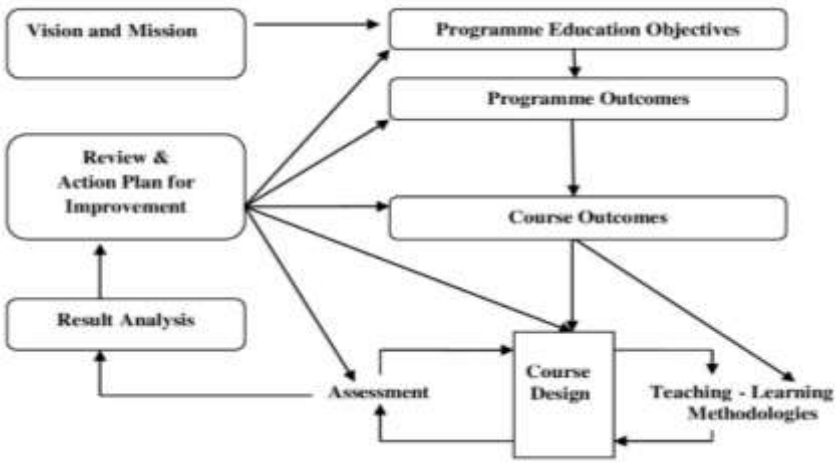
PO-PEO Mapping Matrix

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	-	-	✓

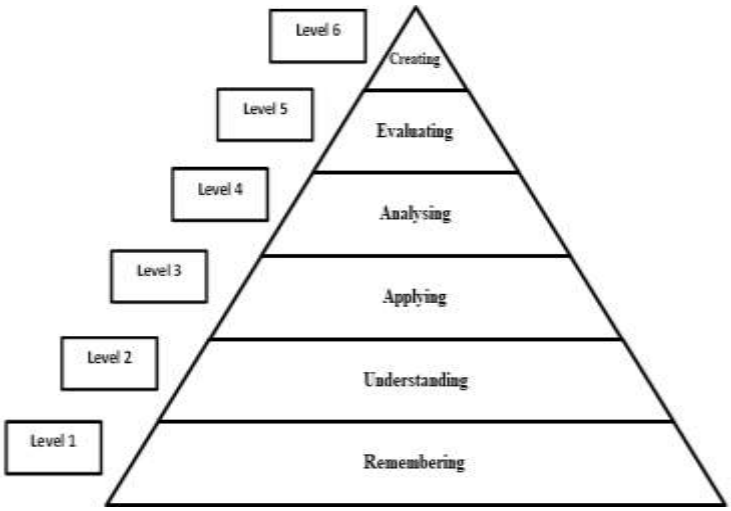
B.1.4 Course Outcomes (COs)

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 1 respectively.

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

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

ELIGIBILITY FOR ADMISSION

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 Questions**	**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	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 (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
Total	**:**	**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% - 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.

These rules come into effect from 2023-2024 onwards.

B.3 ASSESSMENT MANAGEMENT PLAN

An Assessment Management Plan that details the assessment strategy both at the Programme and the Course levels is prepared. The continuous assessment is implemented using an assessment rubric to interpret and grade students.

B.3.1 Assessment Process for CO Attainment

Assessment is one or more processes carried out by the institution that identify, collect

and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the Continuous Internal Assessments and in End Semester Examination of a Course. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

Direct Assessment (Rubric based) - Conventional assessment tools such as Term Test, Assignment, Quiz and End Semester Summative Examination are used.

Indirect Assessment – Done through Course Exit Survey.

CO Assessment Rubrics

For the evaluation and assessment of COs and POs, rubrics are used. Internal assessment contributes 40% and End Semester assessment contributes 60% to the total attainment of a CO for the theory Courses. For the practical Courses, internal assessment contributes 50% and Semester assessment contributes 50% to the total attainment of a CO. Once the Course Outcome is measured, the PO can be measured using a CO-PO matrix.

CO Attainment

Direct CO Attainment

Course Outcomes of all Courses are assessed and the CO – wise marks obtained by all the students are recorded for all the assessment tools. The respective CO attainment level is evaluated based on set attainment rubrics.

Target Setting for Assessment Method

For setting up the target of internal assessment tools, 55% of the maximum mark is fixed as target. For setting up the target of End Semester Examination, the average mark of the class shall be set as target.

Formula for Attainment for each CO

Attainment = Percentage of students who have scored more than the target marks

$$\text{Percentage of Attainment} = \frac{\text{Number of Students who scored more than the Target}}{\text{Total Number of Students}} \times 100$$

Attainment Levels of COs

Assessment Methods	Attainment Levels	
Internal Assessment	Level 1	50% of students scoring more than set target marks in Internal Assessment tools
	Level 2	55% of students scoring more than set target marks in Internal Assessment tools
	Level 3	60% of students scoring more than set target marks in internal Assessment tools
End Semester Summative Examination	Level 1	50% of students scoring more than average marks in End Semester Summative Examination
	Level 2	55% of students scoring more than average marks in End Semester Summative Examination
	Level 3	60% of students scoring more than average marks in End Semester Summative Examination

Indirect CO Attainment

At the end of each Course, an exit survey is conducted to collect the opinion of the students on attainment of Course Outcomes. A questionnaire is designed to reflect the views of the students about the Course Outcomes.

Overall CO Attainment= 75% of Direct CO Attainment + 25 % of Indirect CO Attainment

In each course, the level of attainment of each CO is compared with the predefined targets. If the target is not reached, the Course teacher takes necessary steps for the improvement to reach the target.

For continuous improvement, if the target is reached, the Course teacher can set the target as a value greater than the CO attainment of the previous year.

B.3.2 Assessment Process for Overall PO Attainment

With the help of CO against PO mapping, the PO attainment is calculated. PO assessment is done by giving 75% weightage to direct assessment and 25% weightage to indirect assessment. Direct assessment is based on CO attainment, where 75% weightage is given to attainment through End Semester Examination and 25% weightage is given to attainment through Internal assessments. Indirect assessment is done through Graduate Exit Survey and participation of students in Co-curricular/ Extra curricular activities.

PO Assessment Tools

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

Programme Articulation Matrix (PAM)

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
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 - 75%)							
Indirect Attainment (Weightage - 25%)							
Overall PO Attainment							

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

Expected Level of Attainment for each of the Programme Outcomes

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

Level of PO Attainment

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

B.3.3 Assessment Process for PEOs

The curriculum is designed so that all the Courses contribute to the achievement of PEOs. The attainment of PEOs is measured after 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 EDUCATIONAL OBJECTIVES

The college has always been involving the key stakeholders in collecting information and suggestions with regard to curriculum development and curriculum revision. Based on the information collected the objectives of the Programme are defined, refined and are inscribed in the form of PEOs. The level of attainment of PEOs defined earlier will be analysed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like Board of Studies, Academic Council and Governing Body may recommend appropriate actions. As per the Outcome Based Education Framework implemented from the Academic Year 2020 -2021, the following are the Programme Structure, the Programme Contents and the Course Contents of B.Sc. Computer Science Programme.

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BACHELOR OF SCIENCE
COMPUTER SCIENCE (UG) (2019)

Outcome Based Education with Choice Based Credit System

Programme Structure - Allotment of Hours and Credits

For those who joined in the Academic Year 2023-2024 and after

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		-	-	-	-	-	
Core Course Practical	5(3)	5(3)	5(3)	4 (3)	5 (3)	6 (3)	30 (18)
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, 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

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B.Sc. COMPUTER SCIENCE -2019
PROGRAMME CONTENT
SEMESTER I

S.No.	Components		Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1.	**Part I**		Tamil/ Hindi	23UTAG11/ 23UHDG11	6	3	3	25	75	100
2.	**Part II**		English	23UENG11	6	3	3	25	75	100
3.	**Part III**	Core Course - 1	Python Programming	23UCSC11	5	5	3	25	75	100
4.		Core Course – 2 Practical I	Python Programming Practical	23UCSC11P	5	3	3	40	60	100
5.		Elective Course	Discrete Mathematics - I	23UCSA11	4	4	3	25	75	100
6.	**Part IV**	NME – 1	Office Automation	23UCSN11	2	2	3	25	75	100
7		SEC - 1 Foundation Course	Problem Solving Techniques	23UCSF11	2	2	3	25	75	100
				Total	**30**	**22**				**700**

B.Sc. COMPUTER SCIENCE
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	23UTAG21/ 23UHDG21	6	3	3	25	75	100
2.	**Part II**		English	23UENG21	6	3	3	25	75	100
3.	**Part III**	Core Course - 3	Programming in C	23UCSC21	5	5	3	25	75	100
4.		Core Course – 4 Practical II	Programming using C Practical	23UCSC21P	5	3	3	40	60	100
5.		Elective Course	Probability and Statistics	23UCSA21	4	4	3	25	75	100
6.	**Part IV**	NME – 2	Introduction to Internet and HTML 5	23UCSN21	2	2	3	25	75	100
7		SEC - 2	Digital Principles	23UCSS21	2	2	3	25	75	100
				Total	**30**	**22**				**700**

B.Sc. COMPUTER SCIENCE -2019

(for those who join in 2023 - 2024)
PROGRAMME CONTENT
SEMESTER III

Sl. No.	Components		Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1.	**Part I**		Tamil/ Hindi	23UTAG31/ 23UHDG31	6	3	3	25	75	100
2.	**Part II**		English	23UENG31	6	3	3	25	75	100
3.	**Part III**	Core Course – 5	Data Structures and Algorithms	23UCSC31	5	5	3	25	75	100
4.		Core Course – 6 Practical – III	Data Structures and Algorithms Practical	23UCSC31P	5	3	3	40	60	100
5.		Elective Course - 3	Numerical Methods	23UCSA31	4	4	3	25	75	100
6.	**Part IV**	SEC – 3 Practical - I	DTP Practical	23UCSS31P	1	1	2	100	-	100
7.		SEC – 4 Practical – II	Web Designing Practical	23UCSS32P	2	2	2	40	60	100
8			Environmental Studies	23UGES41	1	-	-	-	-	-
				Total	**30**	**21**				**700**

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	23UTAG41/ 23UHDG41	6	3	3	25	75	100
2.	**Part II**		English	23UENG41	6	3	3	25	75	100
3.	**Part III**	Core Course – 7	Java Programming	23UCSC41	5	5	3	25	75	100
4.		Core Course – 8 Practical – IV	Java Programming Practical	23UCSC41P	4	3	3	40	60	100
5.		Elective Course - 4	Resource Management Techniques	23UCSA41	4	4	3	25	75	100
6.	**Part IV**	SEC – 5	Computer Organization	23UCSS41	2	2	2	25	75	100
7.		SEC – 6 Practical – III	PHP Programming Practical	23UCSS41P	2	2	2	40	60	100
8			Environmental Studies	23UGES41	1	2	2	100	-	100
				Total	**30**	**24**				**800**

B.Sc. COMPUTER SCIENCE -2019
PROGRAMME CONTENT

SEMESTER V

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	Database Management Systems	23UCSC51	6	6	3	25	75	100
2.		Core Course – 10	Data Analytics using R	23UCSC52	6	6	3	25	75	100
3.		Core Course – 11 Practical – V	Database Management Systems Practical	23UCSC51P	5	3	3	40	60	100
4.		Core Course – 12	Project	23UCSC53PR	1	1	-	100	-	100
5.		Elective Course - 7	Introduction to Data Science/ Artificial Intelligence	23UCSE51/ 23UCSE52	5	4	3	25	75	100
6.		Elective Course – 8 Practical – I	Data Science using R Practical/ Artificial Intelligence Practical	23UCSE53P/ 23UCSE54P	5	3	3	40	60	100
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	23UCSI51	-	1	-	100	-	100
				Total	**30**	**27**				**900**
10.		Extra Credit Course	OOPs with C++ Aptitude	23UCSO51	-	2	3	100	-	100

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	Mobile Applications Development	23UCSC61	6	5	3	25	75	100
2.		Core Course – 14	Computer Networks	23UCSC62	6	5	3	25	75	100
3.		Core Course – 15 Practical – VI	Mobile Applications Development Practical	23UCSC61P	6	3	3	40	60	100
4.		Elective Course - 9	Image Processing/ Cryptography	23UCSE61 23UCSE62	5	4	3	25	75	100
5.		Elective Course – 10 Practical - II	Image Processing Practical/ Cryptography Practical	23UCSE63P 23UCSE64P	5	3	3	40	60	100
6.	**Part IV**	Self Study Course	Discipline Specific Quiz-Online	23UCSQ61	-	1	-	100	-	100
7.		SEC – 7 Professional Competency Skill Enhancement Course	Multimedia Systems	23UCSS61	2	2	2	25	75	100
8.	**Part V**		Extension Activities		-	1	-	100	-	100
				Total	**30**	**24**				**800**

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B.Sc. Computer Science
(for those who join in 2023-2024)

Semester I	**PYTHON PROGRAMMING**	Hours/Week: 5	
Core Course - 1		Credits: 5	
Course Code **23UCSC11**		Internal 25	External 75

Course Outcomes:

On completion of the course, students will be able to

CO1: describe fundamental concepts in Python Programming. [K1]

CO2: interpret the concepts of basic Python, functions, operations on files and string manipulation. [K2]

CO3: infer looping, control statements and representation of complex data using lists, tuples and dictionaries. [K2]

CO4 apply the concepts of basic programming, functions, strings, modules and file handling in Python programs. [K3]

CO5: determine the methods to develop Python programs utilizing control statements, jump statements, list, tuples and dictionaries. [K3]

UNIT I

Basics of Python Programming: History of Python – Features of Python – Literal Constants - Variables and Identifiers - Data Types – Input operations- Comments – Indentation – Operators and Expressions – Type conversions. (15 Hours)

UNIT II

Decision Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Basic Loop Structures/Iterative Statements: while loop, for loop - nested loops- break, continue and pass statements**.** (15 Hours)

UNIT III

Functions and Modules : Function Declaration and Definition – Function Call – Variable Scope and its Lifetime-Return Statement - More on Defining Function - Required Arguments, Keyword Arguments, Default Arguments and Variable Length

Arguments- Recursion. **Modules**: The from import statement– Name of the Modules – Making your own modules. **Python Strings Revisited :** Concatenating, Appending and Multiplying Strings - String are Immutable – Built-in String Methods and Functions – Comparison Strings. (15 Hours)

UNIT IV

Data Structures: Lists: Access values in List- Updating values in Lists- Nested lists – Cloning Lists - Basic list operations - List Methods. Tuples: Creating Tuples - Accessing values in a Tuples, Updating Tuples - Deleting Elements in Tuple – Nested Tuples– Advantages of Tuples over Lists. **Dictionaries:** Creating a Dictionaries, Adding and Modifying an item in a Dictionaries – Modifying an entry – Deleting items – Built-in Dictionary Functions and Methods - Difference between Lists and Dictionaries.

(15 Hours)

UNIT V

File Handling: Types of Files - Opening and Closing Files -Reading and Writing Files: write() and writelines() Methods- append() Method – read() and readlines() Methods – Opening Files with keyword – Splitting words – some other useful File Methods - File Positions- Renaming and deleting files. (15 Hours)

SELF-STUDY:

Jump Statements: break, continue and pass statements**.**

TEXT BOOK

Reema Thareja. (2017). *Python Programming using problem solving approach*, 1st Edition, Oxford University Press.

Unit	Chapter	Section
I	3	3.1, 3.2,3.5-3.9,3.11,3.12,3.16
II	4	4.2 – 4.7
III	5, 6	5.2-5.6 ,5.10, 5.11.1-5.11.3 6.1, 6.2,6.4,6,8
IV	8	8.2.1- 8.2.6 , 8.4.1,8.4.3-8.4.6, 8.4.9,8.4.16,8.6.1-8.6.4 , 8.6.8 - 8.6.9
V	7	7.3-7.7

REFERENCE BOOKS

1. Vamsi Kurama. *Python Programming: A Modern Approach*, Pearson Education.
2. Mark Lutz. *Learning Python*, Orielly.
3. Adam Stewarts. *Python Programming, Online*.
4. Fabio Nelli. *Python Data Analytics,* APress.
5. Kenneth A. Lambert. *Fundamentals of Python – First Programs,* CENGAGE Publication.

WEB RESOURCES

1. https://www.programiz.com/python-programming
2. https://www.guru99.com/python-tutorials.html
3. https://www.w3schools.com/python/python_intro.asp
4. https://www.geeksforgeeks.org/python-programming-language/
5. https://en.wikipedia.org/wiki/Python_(programming_language)

Course Code 23UCSC11	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	2	3	2	2	2	2	2	2	-
CO2	3	2	3	2	2	2	3	2	2	-
CO3	3	3	3	2	3	2	3	3	2	-
CO4	3	3	3	3	3	3	3	3	3	1
CO5	3	3	3	3	3	3	3	3	3	1

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

Dr. G. Karthigai Lakshmi
Mrs. P. Aruna Devi
Heads of the Departments

Dr. M. Chamundeeswari
Ms. A. Dhivya
Course Designers

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B.Sc. COMPUTER SCIENCE

(for those who join in 2023-2024)

Semester I	**PYTHON PROGRAMMING PRACTICAL**	Hours/Week: 5	
Core Course – 2 Practical I		Credits: 3	
Course Code **23UCSC11P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write Python programs using I/O statements and various operators of Python. [K2]

CO2: draw flow chart and write programs with various program structures of Python, functions and modules. [K2]

CO3: demonstrate data representation using Arrays, Strings, List, Tuple, Dictionaries and Files in Python. [K3]

CO4: demonstrate various programs with different inputs and complete the record work. [K3]

CO5: explore the uses of Python compound data in real life. [K3]

Write Python Programs for the following

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.
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 23UCSC11P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	1	1	2	2	2	1	1	-
CO2	3	3	1	1	2	2	2	1	1	-
CO3	3	3	3	2	2	3	2	3	1	1
CO4	3	3	2	2	2	3	2	2	1	1
CO5	3	3	3	3	3	3	2	3	1	1

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

Dr. G. Karthigai Lakshmi
Mrs. P. Aruna Devi
Heads of the Departments

Dr.G.Karthigai Lakshmi
Mrs.T.Chitra
Course Designers

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Semester I	**DISCRETE MATHEMATICS - I**	Hours/Week: 4	
Elective Course		Credits: 4	
Course Code **23UCSA11**		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 order - Exclude Lattices and Topological sorting) (12 Hours)

UNIT III

Counting: The basic of counting - The pigeonhole principle (Exclude Generalized Pigeonhole 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 Relations with constant coefficients). (All theorems and Result statements 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 (Thorems 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*, 7th Edition, Mc Graw Hill Publishing Company.
2. Venkataraman M., Sridharan N. and Chandrasekaran N. (2009). *Discrete Mathematics*, The National Publishing Company.

Unit	Chapter	Section
Text Book 1		
I	1	1.1, 1.2, 1.3, 1.4
II	9	9.1, 9.3, 9.6
III	6	6.1, 6.2, 6.3
	8	8.1, 8.2
IV	10	10.1, 10.2, 10.3, 10.4, 10.6
Text Book 2		
V	6	6.1, 6.2, 6.3, 6.4, 6.5, 6.7

REFERENCE BOOKS

1. Arumugam S. and Thangapandi Isaac A. (2005). *Modern Algebra*, Scitech Publications.
2. Arumugam S. and Ramachandran S. (2005). *Invitation to Graph Theory*, Scitech Publications, Chennai.
3. Tremblay and Manohar. (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 **23UCSA11**	PO1	PO2	PO3	PO4	PO5	PO6	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	1
CO5	3	3	3	3	3	3	1

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

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V.V.VANNIAPERUMAL COLLEGE FOR WOMEN
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VIRUDHUNAGAR - 626 001

B.Sc. COMPUTER SCIENCE
(for those who join in 2023-2024)

Semester I	**PROBLEM SOLVING TECHNIQUES**	Hours/Week: 2	
SEC - 1 Foundation Course		Credits: 2	
Course Code **23UCSF11**		Internal 25	External 75

Course Outcomes:

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

CO1 : familiarize with basics of computer, programming languages, data, flowchart and program. [K1]

CO2 : realize the hardware components, software, steps in programming, concepts of programming and data structures. [K1]

CO3 : explain the need for data, different programming languages, programming structures and modules for problem solving. [K2]

CO4 : identify the use of hardware, software and the relationship between the program steps and flow of data in the program. [K2]

CO5 : explore various programming languages, programming structures to manipulate data, file operation and the use of flowcharts to write programs for the solution of a problem. [K2]

UNIT I

Introduction: History, characteristics and limitations of Computer - Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices - Input Devices and Output devices - Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer - Software: System software and Application software - **Programming Languages:** Machine language, Assembly language, High-level language, 4GL and 5GL - Features of good programming language - Translators: Interpreters and Compilers. (6 Hours)

UNIT II

Data: Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC) - **Structured Programming: Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm - **Flowcharts:** Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts - **Pseudocode:** Writing a pseudocode - Coding, documenting and testing a program: Comment lines and types of errors. **Program design:** Modular Programming (6 Hours)

UNIT III

Selection Structures: Relational and Logical Operators -Selecting from Several Alternatives – Applications of Selection Structures - **Repetition Structures:** Counter Controlled Loops - Nested Loops - Applications of Repetition Structures. (6 Hours)

UNIT IV

Data: Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters. (6 Hours)

UNIT V

Data Flow Diagrams: Definition, DFD symbols and types of DFDs. **Program Modules:** Subprograms - Value and Reference parameters - Scope of a variable – Functions - Recursion. **Files:** File Basics - Creating and reading a sequential file - Modifying Sequential Files. (6 Hours)

SELF-STUDY:

Characteristics and limitations of Computer, Hardware/Anatomy of Computer

TEXT BOOK

Stewart Venit. (2010)**.** *Introduction to Programming: Concepts and Design*, 4th Edition, DreamTech Publishers.

WEB RESOURCES

1. https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm
2. http://www.nptel.iitm.ac.in/video.php?subjectId=106102067
3. http://utubersity.com/?page_id=876

Course Code 23UCSF11	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO7
CO1	3	2	1	3	2	2	1	2	2	2
CO2	2	2	-	1	2	2	1	2	2	1
CO3	3	1	-	1	3	3	2	2	1	3
CO4	2	1	2	2	1	2	1	3	2	1
CO5	3	3	2	2	3	3	1	2	2	3

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

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B.Sc. Computer Science
(for those who join in 2023-2024)

Semester II	**PROGRAMMING IN C**	Hours/Week: 5	
Core Course - 3		Credits: 5	
Course Code **23UCSC21**		Internal 25	External 75

Course Outcomes:

On completion of the course, students will be able to

CO1: identify the features of C language. [K1]

CO2: interpret the concepts of data types, homogeneous data structures, functional models and file manipulation. [K2]

CO3: describe control structures, pointers, input and output operations in C. [K2]

CO4 apply the concepts of user-defined functions, strings, arrays, pointers and file management in C programs. [K3]

CO5: implement control & data structures in C. [K3]

UNIT I

Overview of C: History of C – Importance of C–Basic structure of C Programs. **Constants, Variables and Data Types:** Introduction- Character set - C Tokens - Keywords and Identifiers - Constants - Variables - Data types - Declaration of Variables – Declaration of Storage Class – Assigning Values to Variables - Defining Symbolic Constants – Declaring a Variable as Constant – Declaring a Variable as Volatile – Overflow and Underflow of Data. **Operators and Expressions:** Introduction – Arithmetic Operators – Relational Operators – Logical Operators - Assignment Operators – Increment and Decrement Operators - Conditional Operator - Bitwise Operators - Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Operators – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical Functions. **Managing Input and Output Operations:** Introduction – Reading a Character – Writing a Character - Formatted Input - Formatted Output.

(15 Hours)

UNIT II

Decision Making and Branching: Introduction- Decision Making with IF Statements - Simple IF Statement, The If…Else Statement – Nesting of If…Else Statements–The Else If Ladder –The Switch Statement – The ? : Operator – The Go to Statement. **Decision Making and Looping:** Introduction – The While Statement – The Do Statement – The For Statement– Jumps in Loops. (15 Hours)

UNIT III

Arrays: Introduction – One-dimensional Arrays – Declaration of One-dimensional Arrays – Initialization of One-dimensional Arrays – Two-dimensional Arrays - Initializing Two-dimensional Arrays – Multi-dimensional Arrays – Dynamic-arrays. **Character Arrays and Strings:** Introduction- Declaring and Initializing of String Variables – Reading Strings from Terminals - Writing Strings to Screen – Arithmetic Operations on Characters – Putting Strings Together – Comparison of Two Strings – String-handling Functions – Table of Strings.

(15 Hours)

UNIT IV

User-defined Functions : Introduction- Need for User-defined Functions– A Multi-Function Program – Elements of User-defined Functions – Definition of Functions– Return Values and their Types – Function Calls - Function Declaration - Category of Functions – No Arguments and No Return Values- Arguments but no Return Values- Arguments with Return Values- No Arguments but Return a Value – The Scope, Visibility and Lifetime of Variables. **Structures and Unions:** Introduction – Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization – Copying and Comparing Structure Variables – Arrays of Structures - Unions – Size of Structures. (15Hours)

UNIT V

Pointers: Introduction – Understanding Pointers – Accessing the Address of a Variable – Declaring Pointer Variables – Initialization of Pointer Variables – Accessing a Variable through its Pointer – Pointer Expressions – Pointer Increments and Scale Factor .**File Management in C:** Introduction – Defining and Opening a File – Closing a File – Input / Output Operations on Files – Error Handling during I/O Operations — Command Line Arguments. (15 Hours)

SELF-STUDY:

Some Computational Problems (Page No: 66-67)

Bit Level Programming (Page No: 480-484)

TEXT BOOK

E. Balagurusamy, (2012). *Programming in ANSI C*, 6th Edition, McGraw Hill Education (India) Ltd.

Unit	Chapters	Sections
I	1	1.1,1.2,1.8
	2	2.1-2.14
	3	3.1- 3.12, 3.14-3.16
II	4	4.1- 4.5
	5	5.1 – 5.9
	6	6.1-6.5
III	7	7.1-7.8
	8	8.1-8.9
IV	9	9.1-9.13
	10	10.1-10.6,10.8, 10.12-10.13
V	11	11.1-11.6,11.8-11.9
	12	12.1-12.5,12.7

REFERENCE BOOKS

1. E. Balagurusamy. (2013). *Computing fundamentals and C programming*, Tata McGraw Hill Publishing Company.
2. Byron Gottfried. (2005). *Theory and Problems of Programming with C*, Tata McGraw Hill Publishing Company.

Course Code 23UCSC21	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	2	2	2	3	2	2	2	2	1	-
CO2	3	2	2	3	2	2	2	2	1	-
CO3	3	2	2	2	2	2	2	3	1	-
CO4	3	2	2	3	3	3	3	3	1	-
CO5	3	2	3	3	3	3	3	3	1	-

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

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B.Sc. COMPUTER SCIENCE

(for those who join in 2023-2024)

Semester II	**PROGRAMMING USING C PRACTICAL**	Hours/Week: 5	
Core Course – 4 Practical II		Credits: 3	
Course Code **23UCSC21P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write C programs using various operators and control structures. [K2]

CO2: identify input-process-output model of a program. [K2]

CO3: implement homogeneous and heterogeneous data structures using C [K3]

CO4: develop C programs using functions and pointers[K3]

CO5: design C programs to give solution to real world problems. [K3]

Develop programs in C language for the following concepts

1. Operators
2. Control structures
3. Arrays
4. String manipulation
5. Formatted input and output
6. Built-in functions
7. User defined functions
8. Structures, Unions
9. Pointers
10. Recursion
11. Text files
12. Data files

Course Code 23UCSC21P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	1	1	2	1	1	1	2	1	1	-
CO2	1	1	2	1	1	2	2	1	1	-
CO3	3	3	3	2	2	3	2	3	2	-
CO4	3	2	2	2	2	3	2	2	1	1
CO5	3	3	3	3	3	3	2	3	1	1

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

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Mrs. P. Aruna Devi
Heads of the Departments

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B.Sc. Computer Science
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Semester II	**PROBABII.ITY AND STATISTICS**	Hours/Week: 4	
Elective Course		Credits: 4	
Course Code 23UCSA21		Internal 25	External 75

COURSE OUTCOMES

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

CO1: define the basic concepts in Probability and Statistics. [K1]

CO2: explain the statistical tools used in data analysis. [K2]

CO3: infer the data to draw conclusion in Probability and Statistics. [K2]

CO4: apply the statistical methods to solve real life problems. [K3]

CO5: calculate some statistical constants to get statistical inference. [K3]

UNIT I

Skewness, Moments &Kurtosis: Introduction, Skewness Defined, Tests of Skewness, Measures of Skewness, Moments, Kurtosis. (12 Hours)

UNIT II

Correlation Analysis: Types of Correlation, Methods of Studying Correlation, Karl Pearson's coefficient of correlation, Interpreting Coefficient of Correlation, Coefficient of Correlation and Probable Error, Rank Correlation.

Regression Analysis: Regression Lines, Regression Equations, Deviation taken from Arithmetic Means of X and Y- Deviation taken from Assumed Means (Except Graphing Regression Lines). (12 Hours)

UNIT III

Probability& Expected Value: Calculation of Probability, Theorems of Probability, Conditional Probability, Bayes Theorem, Mathematical Expectation (12 Hours)

UNIT IV

Statistical Inference–**Tests of Hypotheses:** Student's, t-Distribution-Properties of t-Distribution-The t-Table– Application of the t-Distribution. (12 Hours)

UNITV

Chi–Square Test and Goodness of Fit: The Chi-Square Distribution – Constants of Chi-Square Distribution- the Chi-Square test-when the degrees of freedom Exceed 30-Grouping When Individual Frequencies are Small- Uses of Chi-Square Test. (12 Hours)

TEXTBOOK

Gupta.S.P. (2004). *Statistical Methods*, 32nd Revised Edition, Sultan Chand and Sons.

Unit	Volume	Chapter	Pages
I	I	9	330–370(Up to Problem No: 40)
II	I	10	381–394(Up to ProblemNo:11)
			399–411(Up to ProblemNo:22)
	I	11	439-451
III	II	1	759–792(Up to ProblemNo:59)
IV	II	3	911-926(Up to ProblemNo:45)
V	II	4	957–992(Up to ProblemNo:40)

Course Code 23UCSA21	PO1	PO2	PO3	PO4	PO5	PO 6	PO7
CO1	3	2	3	3	3	1	2
CO2	3	3	3	3	3	1	2
CO3	3	3	3	3	3	1	2
CO4	3	2	3	3	3	3	2
CO5	3	2	3	2	3	3	2

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B.Sc. COMPUTER SCIENCE

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Semester II	**DIGITAL PRINCIPLES**	Hours/Week: 2	
SEC- 2		Credits: 2	
Course Code **23UCSS21**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: outline the basics of Number System, Digital Logic, Arithmetic & Data Processing Circuits, Registers and Counters. [K1]

CO2: infer the fundamentals of Combinational Logic Circuits and Flipflops. [K1]

CO3: describe Code Conversion, Logic Gates, Multiplexer, Demultiplexer, Decoders, Encoders, Arithmetic Logic unit, types of Registers and Counters. [K2]

CO4: interpret Boolean Laws and Theorems, Karnaugh Map, Gated and Edge-triggered Flipflops. [K2]

CO5: implement Number System, Code Conversions, Universal Logic Gates, Boolean Laws, Karnaugh Simplification, Data processing Circuits, Arithmetic Circuits, types of flipflops, Registers, Asynchronous and Synchronous Counters for the problem. [K3]

UNIT I

Number Systems and Codes: Binary Number System - Binary-to-Decimal Conversion - Decimal-to-Binary Conversion - Octal Numbers - Hexadecimal Numbers - The ASCII Code - The Excess 3 Code - The Gray Code. **Digital Logic:** The Basic Gates - NOT, OR, AND Gates - Universal Logic Gates - NOR, NAND. (4 Hours)

UNIT II

Combinational Logic Circuits: Boolean Laws and Theorems - Sum-of-Products Method - Truth Table to Karnaugh Map - Pairs, Quads and Octets - Karnaugh Simplifications – Don't Care Conditions - Product-of-sums Method - Product-of-sums Simplifications.

(5 Hours)

UNIT III

Data Processing Circuits: Multiplexers – Demultiplexers - 1-of-16 Decoders - BCD-to-decimal Decoders – Encoders - Exclusive-OR gates. **Arithmetic Circuits:** Binary Addition - Binary Subtraction – 2's Complement Representation – 2's Complement Arithmetic - Arithmetic Building Blocks - The Adder - Subtractor - Arithmetic Logic Unit.

(7 Hours)

UNIT IV

Flip-Flops: RS Flip-Flops - Basic Idea - NOR-Gate Latch - Gated Flip-Flops - Edge-triggered RS Flip-Flops - Edge-triggered JK Flip-Flops - JK Master-Slave Flip-Flops.

(7 Hours)

UNIT V

Registers: Types of Registers - Serial In-Serial Out - Serial In-Parallel Out. **Counters:** Asynchronous Counters - Synchronous Counters - Mod-8 binary counter with parallel clock input - Synchronous 4-bit up-down counter.

(7 Hours)

SELF-STUDY: (Not included for examination)

Parallel In-Serial Out - Parallel In-Parallel Out – **Page Nos. : 316 - 324**

TEXT BOOK

Albert Paul Malvino, Donald P.Leach & GoutamSaha (2011). *Digital Principles and Applications,* 7th Edition, Tata McGraw-Hill, New Delhi.

UNIT	CHAPTER	SECTIONS
I	**5**	**5.1 - 5.8**
	2	**2.1 - 2.2**
II	**3**	**3.1 – 3.8**
III	**4**	**4.1 - 4.4, 4.6 - 4.7**
	6	**6.1 - 6.2, 6.5 - 6.8, 6.10**
IV	**8**	**8.1 - 8.3, 8.5, 8.8**
V	**9**	**9.1 - 9.3**
	10	**10.1, 10.3**

REFERENCE BOOKS

1. Sanjay Sharma (2013). *Digital Electronics and Logic Design,* S.K. Kataria & Sons publishers, India.
2. Raj Kamal (2012). *Digital Systems: Principles and Design*, Pearson Education India.
3. John F. Wakerly (2009). *Digital Design Principles and Practices,* 4th Edition, Pearson Education.
4. Morris Mano, M., Michael D. Ciletti (2008). *Digital Design*, 4th Edition, Pearson Education.

Course Code 23UCSS21	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	-	1	-	-	-	2	2	-	-
CO2	3	-	2	-	-	-	3	3	-	-
CO3	3	-	3	3	2	-	3	3	2	2
CO4	3	-	3	3	-	2	3	3	2	-
CO5	3	-	3	2	2	3	3	3	2	-

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

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Semester III	**DATA STRUCTURES AND ALGORITHMS**	Hours/Week: 5	
Core Course – 5		Credits: 5	
Course Code **23UCSC31**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: define the data structures used to represent data in memory. [K1]

CO2: explain the linear and non-linear data structures as ADT and algorithmic techniques. [K2]

CO3: describe the operations of data structures and algorithmic procedures. [K2]

CO4: use suitable data structures and algorithms for solving problems. [K3]

CO5: implement the operations of data structures and algorithmic procedures . [K3]

UNIT I

ARRAY-BASED LISTS: Search - Insert – Remove – Time Complexity of List Operations. **Linked Lists:** Some Properties - Item Insertion and Deletion - Building a Linked List - Linked List as an ADT - Structure of Linked List Nodes – Destroy the List - Initialize the List - Print the List - Length of a List - Retrieve the Data of the First Node - Retrieve the Data of the Last Node. **Unordered Linked Lists:** Search the List - Insert the First Node - Insert the Last Node. **Definition of Doubly and Circular linked list**

(15 Hours)

UNIT II

STACKS : Implementation of Stacks as Arrays : Initialize Stack - Empty Stack - Full Stack - Push - Return the Top Element - Pop. **Linked Implementation of Stacks :** Empty Stack and Full Stack - Initialize Stack - Push - Return the Top Element - Pop.

Queues : **Queue Operations : Implementation of Queues as Arrays** - Empty Queue and Full - Queue - Initialize Queue - Front - Back - Add Queue - Delete Queue. **Linked Implementation of Queues :** Empty and Full Queue - Initialize Queue - addQueue, front, back, and deleteQueue Operations. (15 Hours)

UNIT III

Binary Trees : Binary Trees - Copy Tree - Binary Tree Traversal: Inorder Traversal - Preorder Traversal - Postorder Traversal - Implementing Binary Trees - Binary Search Trees - Search - Insert. (15 Hours)

UNIT IV

Graphs : Introduction - Graph Definitions and Notations - Graph Representation - Adjacency Matrices - Adjacency Lists - Operations on Graphs - Graphs as ADTs - Graph Traversals - Depth-First Traversal - Breadth-First Traversal. (15 Hours)

UNIT V

2 **Divide-and-Conquer:** Binary Search – Mergesort – Quicksort. **The Greedy Approach:** Minimum Spanning Trees: Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm for Single Source Shortest Paths. (15 Hours)

SELF-STUDY: (Not included for Examination)

Polynomial Operations, Application of Stacks: Postfix Expressions Calculator
(Page Nos. : 187 – 194, 428 – 437)

TEXT BOOKS

1. D.S. Malik (2009). *Data Structures Using C++*, 2nd Edition, Cengage Learning, India.
2. Richard Neapolitan & Kumarss Naimipour (2008). Foundations of Algorithms Using C++ Pseudocode. 3rd Edition. Jones and Bartlett Publishers, Inc, Sudbury, MA, United States.

UNIT	TEXT BOOKS	CHAPTERS	PAGES
I	Text Book1	3	181-194
		5	266-280, 286-288, 292-299, 310, 326
II		7	400-406, 415-422
		8	454-469
III		11	600-621
IV		12	686-699
V	Text Book2	2	48–51, 53-55, 60-62
		4	140-148, 150-152, 156-158

REFERENCE BOOKS

1. Mark Allen Weiss (2014). *Data Structures and Algorithm Analysis in C++*, 4th Edition, Pearson Education.
2. Reema Thareja (2014). *Data Structures Using C*, 2nd Edition, Oxford Universities Press
3. ISRD Group (2011). *Data Structures through C++*, 1st Edition, McGraw-Hill Company.
4. John R.Hubbard (2000). *Data Structures with C++*, 2nd Edition, Schaum's Outline.
5. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, (June 2006). *Fundamentals of Data Structures in C++*, 2nd Edition, Silicon Press.
6. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran (2005). *Fundamentals of Computer Algorithms*. Galgotia Publications, India.

Course Code 23UCSC31	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	-	-	-	3	-	-	2	-	-
CO2	3	-	2	2	2	-	2	2	2	-
CO3	3	-	2	2	2	2	-	2	-	-
CO4	3	2	-	2	3	2	-	3	-	-
CO5	3	2	-	2	3	2	2	3	2	-

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

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Semester III	**DATA STRUCTURES AND ALGORITHMS PRACTICAL**	Hours/Week: 5	
Core Course – 6 (Practical – III)		Credits: 3	
Course Code **23UCSC31P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write programs to implement data structures and algorithmic techniques. [K2]

CO2: identify ADT required for linear and non-linear data structures. [K2]

CO3: implement operations like search, merge, insertion and deletion on various linear data structures. [K3]

CO4: apply traversals algorithms on tree data structure. [K3]

CO5: execute searching and sorting algorithms for solving problems. [K3]

Write C++ programs for the following

1. to perform insertion and deletion operation in the given one dimensional dynamic array.
2. to perform the insertion operation in a singly Linked list.
3. to perform the deletion operation in a singly Linked list.
4. to perform search operation in a singly linked list.
5. to perform push and pop operations in a stack – (represent stack as array).
6. to perform push and pop operations in a stack – (represent stack as linked list).
7. to perform insert and delete operations in a queue – (represent queue as array).
8. to perform insert and delete operations in a queue – (represent queue as linked list).
9. to traverse a binary search tree – (Inorder , Preorder, Postorder).
10. to count number of leaf nodes in the given binary search tree.
11. to search an element in the given one dimensional dynamic array using binary search.
12. to sort an array of numbers using selection sort.
13. to sort an array of numbers using insertion sort.

14. to sort an array of numbers using quicksort.
15. to sort an array of numbers using mergesort.

Course Code 23UCSC31P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	2	2	2	2	-	3	-	-
CO2	3	3	2	2	2	2	2	3	-	-
CO3	3	3	3	2	2	2	2	3	-	-
CO4	3	3	3	2	3	3	2	3	2	-
CO5	3	3	2	2	3	3	2	2	-	-

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

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B.Sc. COMPUTER SCIENCE
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Semester III	**NUMERICAL METHODS**	Hours/Week: 4	
Elective Course		Credits: 4	
Course Code **23UCSA31**		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, A.Thangapandi lssac.A, Somasundaram.A, *Numerical Methods*, Second Edition, SCITECH publications. Reprint, December 2013.

REFERENCE BOOK:

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

WEB RESOURCES

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

Course Code 23UCSA31	**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)

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Semester III	**DTP PRACTICAL**	Hours/Week: 1
SEC – 3 Practical – I		Credit: 1
Course Code **23UCSS31P**		Internal 100

COURSE OUTCOMES

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

CO1: write steps for basic Photoshop Techniques.[K2]

CO2: write steps to edit photos and animate with Photoshop tools. [K2]

CO3: show the skill of working with multiple layers in Photoshop. [K3]

CO4: demonstrate various Filtering Effects, Techniques and complete the record work. [K3]

CO5: use creative thought processes to create professional designs. [K3]

Design the following Exercises:

1. using filters
2. using lasso tool
3. for cloning and transformation
4. using paint bucket , color picker and brush tools
5. for animation creation
6. for blur effect
7. using text and transform tools
8. for color balance
9. using clone stamp and smudge tools
10. for 3D object creation

Course Code 23UCSS31P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	1	1	2	2	2	1	1	-
CO2	3	3	1	1	2	2	2	1	1	-
CO3	3	3	3	2	2	3	2	3	1	1
CO4	3	3	2	2	2	3	2	2	1	1
CO5	3	3	3	3	3	3	2	3	1	1

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

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Semester III	**WEB DESIGNING PRACTICAL**	Hours/Week: 2	
SEC – 4 Practical – II		Credits: 2	
Course Code **23UCSS32P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write program using various HTML and CSS elements.[K2]

CO2: write program using conditional and looping statements in JS [K2]

CO3: demonstrate appropriate transition and animation effects on objects in web page **.** [K3]

CO4: prepare record with outputs of different Java Script and HTML programs. [K3]

CO5: create forms in a neat format using HTML and CSS.[K3]

Write HTML Programs

1. to display a simple table
2. to design any application form
3. to demonstrate Image Map
4. to design a website with 5 pages and navigate using tabs

CSS Exercises:

5. To demonstrate the use of various selectors
6. To demonstrate the use of transforms
7. To demonstrate the use of animation
8. To demonstrate the use of gradient
9. To design web pages using inline style sheet
10. To design web pages using internal style sheet
11. To design web pages using external style sheet

Java Script Exercises:

12. To get input from the user and perform number manipulation.
13. To implement if statement
14. To implement for and while statements
15. To create slideshow.

Course Code 23UCSS32P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	-	-	2	-	-	1	-	-
CO2	3	3	3	3	3	3	3	1	-	-
CO3	3	3	-	-	-	-	-	3	1	1
CO4	3	2	2	2	2	2	2	2	1	1
CO5	3	2	2	2	3	3	2	3	1	1

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

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Semester IV	**JAVA PROGRAMMING**	Hours/Week: 5	
Core Course – 7		Credits: 5	
Course Code **23UCSC41**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: understand the Object-oriented concepts and constructs in Java. [K1]

CO2: infer packages, inheritance, interface, multi-threads, and exceptions. [K2]

CO3: describe the usage of IO streams, AWT controls, Swing components and event handling mechanisms. [K2]

CO4: implement inheritance, packages, interfaces, exception handling, multi-threading, I/O streams. [K3]

CO5: employ event handling mechanisms with AWT controls and Swing components to create GUI. [K3]

UNIT I

Introducing Classes: Class Fundamentals – Declaring Objects – Assigning Object Reference variables – Introducing Methods – Constructors – The this keyword. **Inheritance**: Inheritance basics – Using super – Creating a Multilevel hierarchy – When Constructors are called - Method Overriding - Dynamic method dispatch – using Abstract classes - using final with Inheritance – The Object class. (15 Hours)

UNIT II

Packages and Interfaces: Packages - Access Protection – Importing Packages - Interfaces. **Exception Handling**: Exception Handling Fundamentals - Using try and catch – Multiple catch Clauses – Nested try statements - throw - throws – finally – Built-in exceptions - Creating own Exception subclasses. **Multithreaded Programming**: Thread Class and the

Runnable interface – Creating a Thread – Creating Multiple Threads - Synchronization - Inter thread Communication. (15 Hours)

UNIT III

Input/Output: Exploring java.io: The Java I/O Classes and Interfaces – File – The Stream Classes – The Byte Streams – The Character Streams. **Event Handling:** Two Event Handling mechanisms – The Delegation Event Model - The Event Classes – Sources of Events – Event Listener Interfaces – Using the Delegation Event Model. (15 Hours)

UNIT IV

Introducing the AWT: The AWT Classes – window fundamentals - Working with Frame windows – Working with Color – Working with Fonts - **Using AWT Controls, Layout Managers and Menus:** Labels – Using Buttons – Applying Check Boxes – CheckBox Group – Choice Controls – Using Lists – Managing Scroll bars – Using a TextField – Using a TextArea – Understanding Layout managers – Menu Bars and Menus.

(15 Hours)

UNIT V

Introducing Swing: The Origin of Swing – Components and Containers – A simple Swing Application – The Swing Packages – **Exploring Swing:** Jlabel and ImageIcon - JTextField – The Swing Buttons - JScrollPane - JList – JcomboBox. (15 Hours)

SELF-STUDY: (Not included for Examination)

Java Evolution – Page Nos.: 13, 14

TEXT BOOK

Herbert Schildt (2010), *Java The Complete Reference,* 7th Edition, Tata McGraw Hill, New Delhi.

UNIT	CHAPTER	PAGES
I	6	105 - 121
	8	157 - 181
II	9	183 – 202
	10	205, 207 – 221
	11	228 - 233, 238 - 249
III	19	555 - 586
	22	637 - 658
IV	23	663 – 668, 682 – 684, 686 - 690
	24	702 – 741
V	29	859, 862, 863 - 867
	30	879 – 890, 893 - 899

REFERENCE BOOKS

1. Debasish Jana (2008), *Java and Object-Oriented Programming Paradigm*, Prentice Hall of India Private Limited, New Delhi.
2. Y. Daniel Liang (2010.), *Introduction to Java Programming*, 7th Edition, Pearson Education India
3. Dr. Somasundaram (2013), *Introduction to Java Programming*, 1st Edition, Jaico Publishing House, India.

WEB RESOURCES

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

Course Code 23UCSC41	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	1	2	1	2	2	2	-	-
CO2	3	3	1	3	2	3	3	3	-	-
CO3	3	3	2	3	2	3	3	3	-	-
CO4	3	3	1	3	3	3	3	3	-	2
CO5	3	3	1	3	3	3	2	3	-	2

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

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Semester IV	**JAVA PROGRAMMING PRACTICAL**	Hours/Week: 4	
Core Course – 8 Practical – IV		Credits: 3	
Course Code **23UCSC41P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write Java programs using arrays, strings, methods, inheritance, interface and threads. [K2]

CO2: write Java programs using packages, exceptions, AWT Controls and Swing Components. [K2]

CO3: execute Java programs for various inputs. [K3]

CO4: prepare record with Java programs using basic object oriented programming concepts, packages, multi-threads and exception concepts. [K3]

CO5: implement simple graphical methods using AWT Controls and Swing Components. [K3]

Write Java programs to implement the following concepts

1. Arrays
2. Constructors
3. Method Overloading
4. Method Overriding
5. Inheritance
6. Interface
7. Packages
8. String Manipulation

9. Multi-thread
10. Built-in exceptions.
11. User defined exceptions
12. Frames and Controls
13. AWT Layouts
14. Swing Components

Course Code 23UCSC41P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	2	2	2	3	1	1	1	-	-
CO2	3	2	3	2	3	2	1	2	-	1
CO3	3	2	3	2	2	2	2	2	2	-
CO4	3	2	3	1	2	2	1	2	-	-
CO5	3	3	3	2	3	2	3	3	2	2

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

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Semester IV	**RESOURCE MANAGEMENT TECHNIQUES**	Hours/Week: 4	
Elective Course		Credits: 4	
Course Code **23UCSA41**		Internal 25	External 75

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: define the basic concepts in OR, LPP and Transportation Problems. [K1]

CO2: explain various methodologies involved in resource management techniques. [K2]

CO3: find the optimal solutions to various problems using optimization techniques. [K2]

CO4: apply the acquired computational skills to formulate the problems in real life situations. [K3]

CO5: use various transportation techniques in various domains. [K3]

UNIT I

Development of OR : Definition of OR- Modelling-Characteristics and Phases-Tools,Techniques & Methods-scope of OR. (12 hours)

UNIT II

Linear Programming Problem : Formulation-Slack & surplus variables- Graphical solution of LPP. (12 hours)

UNIT III

Simplex Method : Computational Procedure-Big M method-Concept of duality in LPP-Definition of primal and dual problems-General rules for converting any primal into its dual. (12 hours)

UNIT IV

Duality: Theorems (without proof)- Primal and dual correspondence-Duality and simplex method –Mathematical formulation of assignment problem-Method for solving assignment problem. (12 hours)

Unit V

Mathematical Formulation of Transportation Problem : Methods for finding Initial Basic Feasible Solution for the Transportation Problems, Optimal Solution (Excluding Unbalanced, Degeneracy and Non-Degeneracy). (12 hours)

TEXT BOOK:

1. Sharma.S.D, *Operations Research*, Kedar Nath Ram Nath & Co.

REFERENCE BOOKS:

1. Operation Research, R.Sivarethinamohan, Tata McGraw Hill, 2005.

2. Operation Research, Nita H.Shah, Ravi M.Gor and Hardiksoni, Prentice-Hall of India Pvt. Ltd., New Delhi 2008.

Web Resources:

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

Course Code 23UCSA41	PO1	PO2	PO3	PO4	PO5	PO 6	PO7
CO1	3	2	1	3	2	1	-
CO2	3	2	-	3	2	1	-
CO3	3	2	1	3	2	1	-
CO4	3	2	1	3	2	1	-
CO5	3	2	1	3	1	1	-

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

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B.Sc. COMPUTER SCIENCE
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Semester IV	**COMPUTER ORGANIZATION**	Hours/Week: 2	
SEC - 5		Credits: 2	
Course Code **23UCSS41**		Internal 25	External 75

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

CO1: outline the basic components and architecture of basic computing system. [K1]

CO2: realize the working of functional units simple computer. [K1]

CO3: infer the relationship between central processing, input/output and memory units. [K2]

CO4: summarise the various types of instructions, addressing modes, arithmetic algorithms and memories. [K2]

CO5: experiment the different addressing modes and arithmetic algorithms with various input data and memories for various sizes. [K3]

UNIT I

Basic Computer Organization and Design: Instruction Codes – Computer Registers – Computer Instructions – Instruction Cycle (6 Hours)

UNIT II

Central Processing Unit: General Register Organization – Stack Organization – Addressing Modes. (6 Hours)

UNIT III

Central Processing Unit: Data Transfer and Manipulation - **Computer Arithmetic:** Introduction – Addition and Subtraction (6 Hours)

UNIT IV

Input-Output Organization: Input-Output Interface – Asynchronous Data Transfer – Direct Memory Access. (6 Hours)

UNIT V

Memory Organization: Main Memory – Associative Memory – Cache Memory – Virtual Memory (6 Hours)

SELF-STUDY: (Not included for Examination)

Basic Computer Organization and Design: Timing and Control (Page Nos. 137 -141)

TEXT BOOK

M. Morris Mano (2003). *Computer System Architecture*, 3rd Edition, Prentice Hall of India., India.

UNIT	CHAPTER	SECTIONS
I	**5**	**5.1- 5.3, 5.5**
II	**8**	**8.2, 8.3, 8.5**
III	**8**	**8.6**
	10	**10.1-10.3**
IV	**11**	**11.2, 11.3, 11.6**
V	**12**	**12.2, 12.4-12.6**

REFERENCE BOOKS

1. V.Carl Hamacher, Zronko G Vranesic, S, Softwat G. Zaky (2014). *Computer Organization*, 5th Edition, McGraw Hill International Standard Edition, New York, USA.
2. William Stallings (2016). *Computer Organization and Architecture Designing for Performance*, 10th Edition, Pearson Education, India.
3. Mostafa Abd-El-Barr, Hesham El-Rewini (2005). *Fundamentals of Computer Organization and Architecture*, John Wiley & Sons, Inc. Publication, New Jersey, Canada.

Course Code 23UCSS41	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	-	-	-	-	1	3	3	-	-
CO2	3	-	2	2	2	1	2	2	1	-
CO3	3	1	1	-	3	3	2	2	2	-
CO4	3	-	2	1	1	2	2	2	1	-
CO5	3	-	1	-	-	2	3	3	1	-

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

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Semester IV	**PHP PROGRAMMING PRACTICAL**	Hours/Week: 2	
SEC – 6 Practical – III		Credits: 2	
Course Code **23UCSS41P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: formulate the web pages that communicates information effectively to the user. [K2]

CO2: design the web pages by identifying the proper tools and techniques. [K2]

CO3: develop the interactive web page through the source code with the help of appropriate editor. [K3]

CO4: demonstrate the webpages using various real-time inputs. [K3]

CO5: construct the webpages for the necessary data validation and for web ethics.[K3]

Write PHP Program for the following:

1. Design a webpage with various menu options.
2. Design a webpage with sidebars.
3. Design a website with slideshow.
4. Design a website with multiple frames.
5. Design a website to display form responses in another page.
6. Design a website to display form responses within the same page.
7. Store the current date and time in a COOKIE and display the information about the 'Last Visit'.
8. Store the number of visits on a web page in SESSION and to show it on the webpage.
9. Create table dynamically in a Database.
10. Insert, update and delete records into the table in Database.

11. Display entire information from a table in Database.
12. Display selective information from more than one table in Database.
13. Apply join query in the Database.
14. Validate user login.
15. Upload image.
16. Import excel file contents into database.
17. Export data from database into excel format.
18. Export data from database into PDF format.
19. Design home page for department website. (include social media icons in it)
20. Develop admin dashboard.

Course Code	PO1		PO2		PO3	PO4	PO5		PO6	PO7
23UCSS41P	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	3	3	3	2	2	3	3	3
CO2	3	3	3	3	3	2	2	3	3	2
CO3	2	2	2	1	2	-	-	-	2	2
CO4	1	1	2	1	1	-	-	-	1	-
CO5	3	3	3	3	3	3	2	3	1	3

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

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Semester V	**DATABASE MANAGEMENT SYSTEMS**	Hours/Week:6	
Core Course 9		Credits:6	
Course Code **23UCSC51**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: understand the basic concepts of data base system management systems and PL/SQL. [K1]

CO2: describe the principles of database design concepts and SQL. [K2]

CO3: illustrate database operations by utilizing relational algebra and PL/SQL, normalization methods, and the E-R model. [K2]

CO4: discover the usefulness of different relational algebra operations with SQL and the quality of the database design using different normal forms. [K3]

CO5: apply the concepts of database management systems to solve any real database applications. [K3]

UNIT I

Database Concepts: Database Systems: Data vs Information - Introducing the database – Evolution of the File System Data Processing - Problems with File System Data Processing – Database Systems. **Data Models:** Data Modeling and Data Models - Importance of Data Models – Data Model Basic Building Blocks - Evolution of Data models - Degrees of Data Abstraction**.** (18 Hours)

UNIT II

Design Concepts: Relational Database Model: Logical view of Data - Keys - Integrity Rules - Relational Set Operators - Relationships within the Relational Database - Indexes. **Entity Relationship (ER) Modeling:** The Entity Relationship Model (ERM) – Developing an ER diagram (18 Hours)

UNIT III

Normalization of Database Tables: Database Tables and Normalization – The Need for Normalization – The Normalization Process – Higher-Level Normal Forms. **Introduction to Structured Query Language (SQL):** Introduction to SQL - Data Definition Commands – Data Manipulation Commands – SELECT Queries. (18 Hours)

UNIT IV

Introduction to Structured Query Language (SQL): Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables. **Advanced SQL**: Relational SET Operators - SQL Join Operators - Sub Queries and Correlated Queries -SQL Functions. (18 Hours)

UNITV

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment Operation – Arithmetic Operators. **Control Structures and Embedded SQL:** Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation in PL/SQL – Transaction Control Statements. **PL/SQL Cursors and Exceptions:** Cursors – Implicit Cursors - Explicit Cursors - Explicit Cursor and Attributes – Cursor FOR Loops – SELECT…FOR UPDATE Cursor – WHERE CURRENT OF Clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions. (18 Hours)

SELF-STUDY: (Not included for Examination)

Codd's Relational Database Rules (Text book1 - Pages: 88, 89)

TEXT BOOKS

1. Coronel, Morris, Rob. (2009). *Database Systems, Design, Implementation and Management*, 9th Edition, Cengage Learning.
2. Nilesh Shah. (2016). *Database Systems Using Oracle*, 2nd edition, Pearson Education India.

UNIT	TEXT BOOK	CHAPTERS	PAGES
I	1	1	5-24
		2	30-32, 34-50
II		3	59-74, 76-83, 88
		4	100-128
III		6	175-187, 192-197
		7	221-253
IV		7	253-275
		8	298-330
V	2	10	225-234, 236, 240
		11	245-264
		12	268-289

REFERENCE BOOKS

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan. (2020). *Database System Concepts*, 7th Edition, McGraw Hill International Publication.
2. Shio Kumar Singh. *Database Systems*, 2nd Edition, Pearson publications.
3. Ramez Elmasri, Shamkant B. Navathe. (2016). *Fundamentals of Database Systems*, 7th Edition, Pearson Education Pvt. Ltd, India.

Course Code 23UCSC51	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	2	1	3	1	1	1	2	2	1	-
CO2	2	3	3	1	2	2	2	3	1	-
CO3	3	3	2	2	3	2	2	2	1	-
CO4	3	2	2	2	1	3	3	3	2	-
CO5	3	3	2	3	3	3	3	3	2	1

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

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Quality Education with Wisdom and Values

B.Sc. COMPUTER SCIENCE

(for those who join in 2023 - 2024)

Semester V	**DATA ANALYTICS USING R**	Hours/Week:6	
Core Course 10		Credits:6	
Course Code **23UCSC52**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: define big data analytics concepts and basic programming constructs in R Programming. [K1]

CO2: understand the characteristics of big data applications and R Programming data structures. [K2]

CO3: infer the data analytics using R. [K2]

CO4: use analytics methods, data structures and object oriented programming in R. [K3]

CO5: apply R Programming data structures and mathematical functions to solve the real time problems. [K3]

UNIT I

Introduction to Big Data: What is analytics? – Characteristics of Big Data – Domain Specific Examples of Big Data. **Big Data Patterns:** Analytics Architecture Components & Design Styles. **Big Data Storage:** HDFS**. Batch Analysis:** Hadoop and Map Reduce – Hadoop - Map Reduce Examples. (18 Hours)

UNIT II

Getting Started: Introduction to Functions – Preview of Some Important R Data Structures. **Vectors:** Scalars, Vectors, Arrays and Matrices – Declarations – Common Vector Operations – Vectorized Operations. **R Programming Structures:** Control Statements – Environment and Scope Issues. (18 Hours)

UNIT III

Lists: Creating Lists – General List Operations – Accessing List Components and Values – Applying Functions to Lists. **Data Frames:** Creating Data Frames: Accessing Data Frames – Other Matrix-Like Operations. (18 Hours)

UNIT IV

Factors and Tables: Factors and Levels, Common Functions Used with Factors, Working with Tables. **Doing Math and Simulations in R:** Math Functions – Functions for Statistical Distributions. **(**18 Hours)

UNIT V

Object-Oriented Programming: S3 Classes - S4 Classes - S3 Versus S4. **String Manipulation:** An Overview of String-Manipulation Functions. (18 Hours)

SELF-STUDY: (Not included for Examination)

Doing Math and Simulations in R: Linear Algebra Operations on Vectors and Matrices (Section: 8.4)

TEXT BOOKS

1. Norman Matloff. (2011). *The Art of R Programming- A Tour of Statistical Software Design*.
2. Arshdeeep Bahga, Vijay Madaisetti. (2018). *Big Data Analytics, A Hands-On Approach.*

UNIT	TEXT BOOK	CHAPTERS	SECTIONS
I	2	1	1.1, 1.3, 1.4
		3	3.1
		6	6.1
		7	7.1, 7.2
II	1	1	1.3, 1.4
		2	2.1, 2.2, 2.4, 2.6
		7	7.1, 7.6
III	1	4	4.1 - 4.4
		5	5.1, 5.1.1, 5.2
IV	1	6	6.1 - 6.3
		8	8.1, 8.2
V	1	9	9.1 - 9.3
		11	11.1

REFERENCE BOOKS

1. Garrett Grolemund, Hadley Wickham. (2014). *Hands-On Programming with R: Write Your Own Functions and Simulations* , 1st Edition, O'Reilly Media, Inc.,
2. Tom White. (2012). *Hadoop: The Definitive Guide* 3rd Edition, O'Reilly Media, Inc
3. Seema Acharya, Subhasini Chellappan. (2015). *Big Data Analytics*, 2nd Edition, Wiley

Course Code 23UCSC52	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	3	1	2	1	2	2	1	-
CO2	3	3	3	1	2	2	2	3	1	-
CO3	3	3	2	2	3	2	2	2	1	1
CO4	3	3	2	2	3	3	3	3	3	1
CO5	3	3	2	3	3	3	3	3	3	1

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

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Semester V	**DATABASE MANAGEMENT SYSTEMS PRACTICAL**	Hours/Week: 5	
Core Course 11 Practical - V		Credits: 3	
Course Code **23UCSC51P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write SQL statements to create and manipulate tables using DDL & DML and display using DQL statements. [K2]

CO2: write PL/SQL programs using functions, procedures, exceptions, cursors and triggers. [K2]

CO3: enter and execute programs for different database and interactive user inputs. [K3]

CO4: generate the results and prepare the output in the required format. [K3]

CO5: examine the results of database query statements in various environments such as command prompt, admin window and user-interactive programs. [K3]

Write SQL commands for the following

1. Create and manipulate the employee pay details using DDL and DML commands.
2. Perform string operations using built-in function.
3. Manipulate students mark details using aggregate functions.
4. Apply nested queries on employee details.
5. Use group by & having clause.
6. Implement different types of join operations.

Write PL/SQL programs for the following

1. Using any 7 string functions.
2. Using any 5 date functions.
3. Display the name of the department with the maximum number of employees.
4. Calculate the student grade using case statement.
5. Calculate incentive achieved according to the specific sale limit.
6. Print the number of products whose price between 0 and Rs. 50,
   Rs. 51 and Rs. 100, Rs 101 and Rs. 150 and Rs. 151 and Rs. 200.
7. Handle user-defined exception for inventory details.
8. Use built-in exception for bank customer details.
9. Update the employee's salary using implicit cursor.
10. Find the highest salary of an employee using explicit cursor.
11. Calculate simple and compound interest using user defined function.
12. Raise the trigger after every insertion and deletion.
13. Prepare EB-Bill for a customer using procedure**.**
14. Calculate employee's net pay using package.

Course Code 23UCSC51P	**PO1**		**PO2**		**PO3**	**PO4**	**PO5**		**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2.a**	**PSO 2.b**	**PSO 3**	**PSO 4**	**PSO 5.a**	**PSO 5.b**	**PSO 6**	**PSO 7**
CO1	3	3	2	2	3	2	2	2	1	2
CO2	3	3	2	2	3	2	2	2	1	2
CO3	2	3	3	1	1	1	1	1	1	-
CO4	2	2	3	1	1	1	1	1	1	-
CO5	3	3	3	2	3	3	2	3	1	-

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

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B.Sc. COMPUTER SCIENCE

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Semester V	**PROJECT**	Hour/Week: 1
Core Course 12		Credits: 1
Course Code **23UCSC53PR**		Internal: 100 Marks

COURSE OUTCOMES

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

CO1: understand the problem for the project. [K2]

CO2: formulate the problem by identifying the objective and project requirements. [K2]

CO3: collect the data for the problem domain and identify design methodologies based on the collected data. [K3]

CO4: implement the source code based on programming tools and techniques to solve the problem. [K3]

CO5: report the project work based on the formulated problem domain. [K3]

- Students are expected to select a project in the field of Computer Science or related interdisciplinary fields.
- Projects can be done individually or in a group of two students.
- Minimum pages for project report should be 20.
- A copy of the project report will be submitted to the Controller of Examinations 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 23UCSC53PR	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	3	2	2	1	2	2	2	2
CO2	3	3	3	2	3	1	2	2	2	2
CO3	3	3	2	3	3	2	3	2	2	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	3	3	3	3	3	3	2	2	3

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

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B.Sc. COMPUTER SCIENCE

(for those who join in 2023 - 2024)

Semester V	**INTRODUCTION TO DATA SCIENCE**	Hours/Week: 5	
Elective Course - 7		Credits: 4	
Course Code **23UCSE51**		Internal 25	External 75

COURSE OUTCOMES

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

CO1 : outline the basics of data science, frameworks (Hadoop, Spark), and types of database. [K1]

CO2 : explain the facets of data, big data ecosystem, model building, machine learning and their types. [K2]

CO3 : discuss the data science process, techniques, graph databases and frameworks. [K2]

CO4 : illustrate methods for retrieving and transforming data from different sources, and applying basic techniques to datasets. [K3]

CO5 : explore the process of data science, frameworks (Hadoop, Spark) and types of databases. [K3]

UNIT I

Data science in a big data world: Benefits and uses of data science and big data – Facets of data – The data science process – The big data ecosystem and data science. (15 Hours)

UNIT II

The data science process: Overview of the data science process – Step 1: Defining research goals and creating - Step 2: Retrieving data – Step 3: Cleansing, integrating and transforming data – Step 4: Exploratory data analysis – Step 5: Build the models. (15 Hours)

UNIT III

Machine learning: What is machine learning? – The modeling process – Types of machine learning - Semi-supervised learning. (15 Hours)

UNIT IV

First steps in big data: Distributing data storage and processing with frameworks. **Join the NoSQL movement:** Introduction to NoSQL. (15 Hours)

UNIT V

Join the NoSQL movement: Case study: What disease is that? **The rise of graph databases**: Introducing connected data and graph databases – Introducing Neo4j: a graph database. (15 Hours)

SELF-STUDY: (Not included for Examination)

First steps in big data: Case study: Assessing risk when loaning money (Section: 5.2)

TEXT BOOK

Davy Cielen, Arno D. B. Meysman, Mohamed Ali. (2016). *Introducing Data Science*, Manning publications.

UNIT	CHAPTERS	SECTIONS
I	**1**	**1.1 – 1.4**
II	**2**	**2.1 – 2.6**
III	**3**	**3.1 – 3.4**
IV	**5**	**5.1**
	6	**6.1**
V	**6**	**6.2**
	7	**7.1,7.2**

REFERENCE BOOKS

1. Roger D. Peng. (2016). *The Art of Data Science*, lulu.com.
2. Murtaza Haider. (2015). *Getting Started with Data Science – Making Sense of Data with Analytics*, 1st Edition, IBM press.
3. Lillian Pierson. (2017). *Data Science for Dummies*, 2nd Edition, For Dummies.

WEB RESOURCES

1. https://www.w3schools.com/datascience/
2. https://en.wikipedia.org/wiki/Data_science
3. http://www.cmap.polytechnique.fr/~lepennec/en/post/references/refs/

Course Code 23UCSE51	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO7
CO1	3	3	1	2	2	2	2	2	1	-
CO2	3	3	1	2	2	2	2	2	1	-
CO3	3	3	1	2	3	3	2	3	1	-
CO4	3	3	2	2	3	3	2	3	2	-
CO5	3	3	2	2	3	3	2	3	2	-

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

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Semester V	**ARTIFICIAL INTELLIGENCE**	Hours/Week: 5	
Elective Course-7		Credits: 4	
Course Code **23UCSE52**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: represent knowledge using various logical and probabilistic formalisms and reason about that knowledge to draw conclusions and make decisions. [K1]

CO2: recognize the basics of AI, the problem of uncertainty and probabilistic reasoning. [K2]

CO3: understand intelligent agents that can solve problems and make decisions in various environments. [K2]

CO4: apply various problem-solving strategies, including search algorithms, adversarial search, and probabilistic reasoning, to solve complex problems. [K3]

CO5: Construct modern logical inference systems and apply reinforcement learning techniques to make decisions under uncertainty. [K3]

UNIT I

Introduction: What is AI? –The History of Artificial Intelligence – Risks and Benefits of AI. **Intelligent Agents:** Agents and Environments – The Nature of Environments – **Solving Problems by Searching:** Problem-Solving Agents – Example Problems.

(15 Hours)

UNIT II

Solving Problems by Searching: Search Algorithms – Uninformed Search Strategies: Breadth-first search – Depth-first search and the problem of memory– Informed (Heuristic) Search Strategies: Greedy best-first search, A* Search. (15 Hours)

UNIT III

Adversarial Search and Games: Optimal Decisions in Games: The minimax search algorithms – Alpha-Beta Pruning. **Probabilistic Reasoning:** Representing Knowledge in an Uncertain Domain - The Semantics of Bayesian Networks. (15 Hours)

UNIT IV

Logical Agents: Knowledge-Based Agents – Propositional Logic: A Very Simple Logic - Propositional Theorem Proving: Inference and proofs, Forward and backward chaining. **First-Order Logic:** Using First-Order Logic: Assertions and queries in first-order logic - Numbers, sets, and lists - Knowledge Engineering in First-Order Logic: The knowledge-engineering process. (15 Hours)

UNIT V

Quantifying Uncertainty: Basic Probability Notation: What probabilities are about - The language of propositions in probability assertions - Inference using Full Joint Distributions - Independence - Bayes' Rule and its Use - **Reinforcement Learning:** Passive Reinforcement Learning - Active Reinforcement Learning: Temporal-difference Q-learning. (15 Hours)

SELF-STUDY: (Not included for Examination)

Exact Inference in Bayesian Networks (Section: 13.3)

TEXT BOOK

Stuart Russell and Peter Norvig. (2022). *Artificial Intelligence: A Modern Approach*, 4th Edition, Pearson Education, India.

UNIT	CHAPTERS	SECTIONS
I	1	1.1, 1.3, 1.5
	2	2.1, 2.3
	3	3.1, 3.2
II	3	3.3, 3.4.1, 3.4.3, 3.5.1, 3.5.2
III	6	6.2.1, 6.2.3
	13	13.1, 13.2
IV	7	7.1, 7.4, 7.5.1, 7.5.4
	8	8.3.1, 8.3.3, 8.4.1
V	12	12.2.1, 12.2.2, 12.3, 12.4, 12.5
	22	22.2, 22.3.3

REFERENCE BOOKS

1. Trivedi, M.C. (2018). *A Classical Approach to Artificial Intelligence,* Khanna Publishing House, Delhi.
2. Saroj Kaushik. (2011). *Artificial Intelligence*, Cengage Learning India.
3. David Poole and Alan Mackworth. (2017). *Artificial Intelligence: Foundations for Computational Agents*, Cambridge University Press.

WEB RESOURCES

1. https://github.com/dair-ai/ML-Course-Notes
2. https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html
3. https://www.toolify.ai/?gclid=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXlRFbcghLMZVwICm_4PkIRcDRE-VYq_wTDcuaQeq_bCHnhoCcm4QAvD_BwE

Course Code 23UCSE52	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	3	3	2	1	3	3	-	-
CO2	3	3	3	3	2	1	3	3	-	-
CO3	3	3	3	3	1	1	3	3	2	1
CO4	3	3	2	3	3	1	3	3	2	1
CO5	3	3	2	3	3	1	3	3	2	1

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

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Semester V	**DATA SCIENCE USING R PRACTICAL**	Hours/Week: 5	
Elective Course - 8 Practical - I		Credits: 3	
Course Code **23UCSE53P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: understand the basic concepts like vector, matrix, control structures and data frame. [K2]

CO2: write programs to evaluate the output of data analysis. [K2]

CO3: use algorithms to manipulate the data. [K3]

CO4: apply various plot methods using different dataset. [K3]

CO5: utilize the results for further analysis of data. [K3]

Write R Programs for the following:

1. Vector manipulation.
2. Matrix manipulation.
3. Creating Data frames.
4. Implementing Conditional and Iterative Statements.
5. Applying Mathematical functions.
6. Using Statistical functions.
7. Using Date functions.
8. Generating
    i. Bar Plot.
    ii. Pie Chart.
    iii. Box Plot.
    iv. Scatter Plot.
    v. Line graph.

9. Implementing Apriori Algorithm.
10. Implementing K-Means Clustering Algorithm.
11. Importing dataset from various file formats.

Course Code 23UCSE53P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO7
CO1	3	3	2	2	3	2	2	2	1	-
CO2	3	3	2	2	3	2	2	3	1	-
CO3	3	3	3	3	3	3	3	3	1	-
CO4	3	3	3	3	3	3	3	3	1	1
CO5	3	3	3	3	3	3	3	3	1	1

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

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Semester V	**ARTIFICIAL INTELLIGENCE PRACTICAL**	Hours/Week:5	
Elective Course - 8 Practical - I		Credits:3	
Course Code **23UCSE54P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write the programs to implement AI algorithms. [K2]

CO2: understand the techniques needed for creating AI applications. [K2]

CO3: build smart system using different informed search / uninformed search or heuristic approaches. [K3]

CO4: apply difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing. [K3]

CO5: design intelligent expert models for perception and prediction from intelligent environment. [K3]

Write programs to implement the following concepts

1. Breadth-First Search to find a path in a maze.
2. Breadth-First Search to find the shortest path in a graph.
3. Depth First Search to find a path in a maze.
4. A* search to find the shortest path in a weighted graph.
5. Tic-Tac-Toe game using the Minimax algorithm.
6. Alpha-Beta pruning to optimize the Minimax algorithm.
7. Propositional logic.
8. Predicate logic.
9. Parser for First-Order Logic formulae.

10. Represent a simple knowledge base using First-Order Logic and implement a query system to retrieve information.
11. Bayesian network to model a simple probabilistic domain.
12. Probabilistic reasoning algorithms (e.g., variable elimination, junction tree algorithm).
13. Decision-making system under uncertainty.

Course Code 23UCSE54P	**PO1**		**PO2**		**PO3**	**PO4**	**PO5**		**PO6**	**PO7**
	PSO1.a	**PSO1.b**	**PSO 2.a**	**PSO 2.b**	**PSO3**	**PSO4**	**PSO 5.a**	**PSO 5.b**	**PSO6**	**PSO7**
CO1	3	3	1	1	3	1	2	3	1	2
CO2	3	3	1	1	3	1	3	3	1	2
CO3	3	3	2	1	3	2	3	3	1	3
CO4	3	3	3	2	3	2	3	3	2	2
CO5	3	3	2	2	3	2	3	3	3	3

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

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B.Sc. COMPUTER SCIENCE
(for those who join in 2023 - 2024)

Semester V	**INTERNSHIP**	Credit: 1
Internship/ Industrial Training		
Course Code 23UCSI51		Internal: 100 Marks

COURSEOUTCOMES
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: apply 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 23UCSI51	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	2	2	3
CO2	3	3	3	2	2	2	3
CO3	3	2	3	2	3	2	3
CO4	3	3	3	3	3	2	3
CO5	3	3	3	3	3	2	3

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

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Mrs. P. Aruna Devi
Heads of the Departments

Mrs. S. Veni
Course Designer

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B.Sc. COMPUTER SCIENCE

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Semester V	**OOPs WITH C++ APTITUDE**	Credits: 2
Extra Credit Course		
Course Code **23UCSO51**		Internal Marks 100

COURSE OUTCOMES

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

CO1: describe the OOPs Concepts with C++.

CO2: demonstrate operator overloading, type conversion, constructors, and destructors in C++.

CO3: implement inheritance, pointers, virtual functions, and polymorphism in C++ programs.

CO4: develop C++ Program using exception handling techniques, string operations, Console I/O Operation and Templates.

CO5: utilize the concepts of object oriented programming with C++ for various entry level exams.

UNIT I

OOPs Concept – Classes and Objects – Structure of C++ Program – Operators in C++: Scope Resolution Operator – Manipulators – Inline Functions – Default Arguments – Function Overloading.

UNIT II

Operator Overloading – Type Conversion – Constructors and Destructors.

UNIT III

Inheritance – Pointers, Virtual Functions and Polymorphism.

UNIT IV

Exception Handling in C++ – Strings in C++.

UNIT V

Managing Console I/O Operations – Templates.

REFERENCE BOOKS

1. E. Balagurusamy. (2008). *Object Oriented Programming with C++*, 4th Edition, McGraw-Hill Education, India.
2. Yashwant Kanetkar. (2003*). Test Your C++ Skills*, BPB Publications, India.
3. Herbert Schildt. (2003). *C++: Complete Reference*, 4th Edition, McGraw-Hill Education, India.

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B.Sc. COMPUTER SCIENCE
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Semester VI	**MOBILE APPLICATIONS DEVELOPMENT**	Hours/Week: 6	
Core Course 13		Credits: 5	
Course Code **23UCSC61**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: recognize the basic android widgets and other android application based components. [K1]

CO2: describe the attributes and methods of layouts, media, maps, animation storage and user interfaces classes . [K2]

CO3: explain the android widgets, dialogs, menus, databases in android applications. [K2]

CO4: classify widgets, layouts and other significant components that can be used in android applications. [K3]

CO5: choose appropriate widgets, layouts and storage requirements for creating secure android applications that prioritize user privacy and data protection. [K3]

UNIT I

Getting Started with Android Programming: What is Android: Android Versions, Features of Android, Architecture of Android - Obtaining the Required Tools: Android SDK, Installing the Android SDK Tools, Configuring the Android SDK Manager, Eclipse, Android Development Tools (ADT), Creating Android Virtual Devices (AVDs) – Create your First Android Application. **Activities, Fragments, And Intents**: Understanding Activities: Applying Styles and Themes to an Activity, Hiding the Activity Title, Displaying a Dialog Window, Displaying a Progress Dialog - Linking Activities Using Intents: Resolving Intent Filter Collision, Returning Results from an Intent, Passing Data Using an Intent Object – Fragments (without program). (18 Hours)

UNIT II

Getting to Know the Android User Interface: Understanding the Components of a Screen: Views and ViewGroups, LinearLayout, AbsoluteLayout, TableLayout, RelativeLayout, FrameLayout, ScrollView. **Designing your User Interface with Views**: Using Basic Views: TextView View, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup Views, ProgressBar View, AutoCompleteTextView View - Using Picker Views: TimePicker View, DatePicker View - Using List Views to Display Long Lists: ListView View, Using the Spinner View.

(18 Hours)

UNIT III

Displaying Pictures and Menus with Views: Using Image Views to Display Pictures: Gallery and ImageView Views, ImageSwitcher, GridView – Using Menus with Views: Creating the Helper Methods, Options Menu, Context Menu - Some Additional Views: AnalogClock and DigitalClock Views, WebView. **Messaging:** SMS Messaging: Sending SMS Messages Programmatically, Sending SMS Messages Using Intent, Receiving SMS Messages - Sending E-mail. (18 Hours)

UNIT IV

Location-Based Services: Displaying Maps: Creating the Project, Obtaining the Maps API Key, Displaying the Map, Displaying the Zoom Control - Changing Views - Navigating to a Specific Location. **Data Persistence:** Creating and Using Databases: Creating the DBAdapter Helper Class, Using the Database Programmatically, Pre-Creating the Database. (18 Hours)

UNIT V

Media Components: Camcorder, Camera, Player, Speech Recognizer, Text to Speech, Video Player – **Drawing and Animation Components:** Canvas. **Sensor Components:** Barcode Scanner, Location Sensor - **Social Components:** ContactPicker, EmailPicker, PhoneCall, PhoneNumberPicker. **Storage Components:** CloudDB, File, TinyDB, TinyWebDB. (18 Hours)

SELF-STUDY: (Not included for Examination)

User Interface Components: List Picker (Study Material – Pages: 32 - 34)

TEXT BOOK

Wei – Meng Lee. (2012). *Beginning Android 4 Application Development*, Wiley Pubishing, India.

UNIT	CHAPTERS	PAGES
I	**1** **2**	**1-5, 9-29** **36-49, 53-69**
II	**3**	**105-123**
	4	**159-202**
III	**5** **8**	**219-249** **321-324, 328-332, 345-347**
IV	**9** **6**	**352-365** **273-289**
V	**Study Material**	**1 - 31**

REFERENCE BOOKS

1. Karen Lang and Selim Tezel. (2022). *Become an App Inventor The official guide from MIT App Inventor*, Miteen Press, Walker Books Limited.
2. Reto Meier. (2012). *Professional Android 4 Application development*, John Wiley and Sons, Inc.
3. Prasanna Kumar Dixit. (2014). *Android*, First Edition, Vikas Publishing House Private Ltd, India.
4. John Horton. (2015). *Android Programming for beginners*, 1st Edition, Packt Publishing, Birmingham, Mumbai, India.

WEB RESOURCES

1. http://ai2.appinventor.mit.edu/reference/ (UNIT – V)
2. http://appinventor.mit.edu/explore/paint-pot-extended-camera

Course Code 23UCSC61	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	2	2	3	2	3	3	-	-
CO2	3	3	2	2	3	2	3	3	-	-
CO3	3	3	2	3	3	2	3	3	2	-
CO4	3	3	2	3	3	3	3	3	2	2
CO5	3	3	2	3	3	3	3	3	2	3

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

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B.Sc. COMPUTER SCIENCE
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Semester VI	**COMPUTER NETWORKS**	Hours/Week: 6	
Core Course - 14		Credits: 5	
Course Code **23UCSC62**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: outline the computer network basics, devices, architecture, functions and various protocols in different layers. [K1]

CO2: summarize the role of different layers in the network architecture. [K2]

CO3: understand the basics of data communication, transmission media and networking concepts.[K2]

CO4: implement different routing algorithms, flow control and error control protocols, congestion control mechanism, network models and transmission media. [K3]

CO5: discover appropriate media for data transmission, routing algorithms, error handling methods, protocols for data transmission. [K3]

UNIT I

Introduction: Network Hardware – Network Software – Reference Models: The OSI Reference Model, The TCP/IP Reference Model – **The Physical Layer**: The Theoretical Basis for Data Communication - Guided Transmission Media. (18 Hours)

UNIT II

The Physical Layer: Wireless Transmission - Communication Satellites – The Public Switched Telephone Network: Structure of the Telephone System, Trunks and Multiplexing, Switching. **The Data Link Layer:** Data Link Layer Design Issues – Error Detection and Correction. (18 Hours)

UNIT III

Data Link Layer: Elementary Data Link Protocols - Sliding Window Protocols – **The Medium Access Control Sublayer:** The Channel Allocation Problem – Multiple Access Protocols – Bluetooth. (18 Hours)

UNIT IV

The Network Layer: Network Layer Design Issues - Routing Algorithms: Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing - Congestion Control Algorithms: Congestion Control in Virtual Circuits subnets, Congestion Control in Datagram subnets – The Network Layer in the Internet: The IP Protocol, IP Addresses. (18 Hours)

UNIT V

The Transport Layer: The Transport Service – Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering - The Internet Transport Protocols: UDP – The Internet Transport Protocols: TCP: The TCP Segment Header, TCP Connection Establishment, TCP Connection Release (18 Hours)

SELF-STUDY: (Not included for Examination)

Network Security: Communication Security (Section: 8.6)

TEXT BOOK

Tanenbaum A.S. (2011). *Computer Networks*, 4th Edition, Prentice-Hall of India.

UNIT	CHAPTERS	SECTIONS
I	1	1.2, 1.3, 1.4.1, 1.4.2
	2	2.1, 2.2
II	2	2.3, 2.4, 2.5.1, 2.5.4, 2.5.5
	3	3.1, 3.2
III	3	3.3, 3.4
	4	4.1, 4.2, 4.6
IV	5	5.1, 5.2.2 – 5.2.6, 5.3.3,5.3.4, 5.6.1, 5.6.2
V	6	6.1, 6.2.1 - 6.2.4, 6.4,6.5.4-6.5.6

REFERENCE BOOKS

1. Forouzan B.A. (2017). *Data Communications and Networking*, 4th Edition, Tata McGraw Hill.
2. Halsall F. (2008). *Data Communications,Computer Networks and Open Systems*, Pearson Education.
3. Bertsekas, D and Gallagher, R. (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 23UCSC62	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO7
CO1	2	1	2	2	1	2	2	2	-	-
CO2	3	1	2	2	1	2	2	2	-	-
CO3	3	1	3	2	1	2	2	2	-	-
CO4	3	1	3	2	2	3	3	3	-	1
CO5	3	2	3	2	2	3	3	3	-	2

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

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Semester VI	**MOBILE APPLICATIONS DEVELOPMENT PRACTICAL**	Hours/Week: 6	
Core Course 15 Practical - VI		Credits: 3	
Course Code 23UCSC61P		Internal 40	External 60

COURSE OUTCOMES

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

CO1: write an android program to implement layouts and widgets in android applications. [K2]

CO2: design the android applications with Spinner, Date/TimePicker, Menus, ListView, GridView. [K2]

CO3: execute android applications using the objects intent, database. [K3]

CO4: prepare record with procedures for designing mobile applications. [K3]

CO5: design android applications by using the right layouts, widgets, listeners, and android components in order to ensure privacy and security. [K3]

Develop Android applications using following widgets

1. Simple Counter.
2. Display personal details of a student.
3. Simple Calculator that uses radio buttons and text view.
4. Intent and Activity.
5. Dialog Boxes.
6. Splash Screen.
7. Layout Managers.
8. Different types of Menus.
9. Send messages from one mobile to another mobile.
10. Send E-mail.
11. Play Audio and Video.

12. Local File Storage.
13. Simple Animation.
14. Login Page using Sqlite.
15. Student Marklist processing using Sqlite.

Course Code 23UCSC61P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	1	1	3	2	2	2	1	2
CO2	3	3	1	1	3	2	3	2	1	2
CO3	3	3	2	1	3	2	3	2	1	3
CO4	3	3	3	2	3	2	3	2	2	2
CO5	3	3	2	2	3	3	3	3	3	3

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

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B.Sc. COMPUTER SCIENCE

(for those who join in 2023 - 2024)

Semester VI	**IMAGE PROCESSING**	Hours/Week: 5	
Elective Course - 9		Credits: 4	
Course Code **23UCSE61**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: outline the fundamentals of digital image, image processing system and applications. [K1]

CO2: understand the representation of images and image processing operations. [K2]

CO3: perform the various operations and transformations on 2D color and gray images. [K2]

CO4: use the different techniques and methods for image enhancement. [K3]

CO5: apply the image compression and reduction techniques for further classification. [K3]

UNIT I

Introduction: What is Digital Image Processing? – Fundamental Steps in DIP - **Digital Image Fundamentals:** Representing Digital Images – Some Basic Relationship between Pixels. **Introduction to Image-processing System:** Elements of an Image-processing System – Applications of Digital Image Processing. **2D Signals and Systems:** 2D Systems – Classification of 2D Systems – 2D Convolution. **Convolution and Correlation:** 2D Convolution Through Graphical Method – 2D Convolution Through Matrix Analysis. (18 Hours)

UNIT II

Image Transforms: Properties of 2D Discrete Fourier Transform (2D-DFT) – Walsh Transform – Hadamard Transform – Haar Transform – Discrete Cosine Transform – Karhunen-Loeve Transform (KL Transform) – Singular Value Decomposition.

(18 Hours)

UNIT III

Image Enhancement: Introduction – Image Enhancement in Spatial Domain – Enhancement Through Point Operation – Types of Point Operation – Histogram Manipulation – Linear Gray-level Transformation – Nonlinear Gray-level Transformation – Local or Neighborhood Operation – Median Filter – Spatial Domain High-pass Filtering or Image Sharpening – Bit-plane Slicing – Image Enhancement in the Frequency Domain – Homomorphic Filter. (17 Hours)

UNIT IV

Image Segmentation: Introduction – Classification of Image-segmentation Techniques – Region Approach to Image Segmentation – Clustering Techniques – Image Segmentation based on Thresholding – Edge-based Segmentation – Classification of Edges – Edge Detection – Hough Transform – Active Contour. **(**11 Hours)

UNIT V

Image Compression: Introduction – Need for Image Compression – Redundancy in Images – Classification of Image Compression Schemes – Huffman Coding – Arithmetic Coding – Dictionary based Compression – Transform based Compression. (11 Hours)

SELF- STUDY: (Not included for Examination)

Binary Image Processing: (Section: 10.3-10.5)

- Mathematical Morphology
- Structuring Elements
- Morphological Image Processing

TEXT BOOKS

1. S Jayaraman, S Esakkirajan, T Veerakumar. (2017). *Digital image processing*, 1st Edition, McGraw Hill Education, India.
2. Rafael C. Gonzalez, Richard E. Woods. (2008). *Digital Image Processing*, 3rd Edition, Pearson Education, India.

UNIT	TEXT BOOKS	CHAPTERS	SECTIONS
I	2	1	1.1, 1.4
		2	2.4.2, 2.5
	1	1	1.8(1.8.1, 1.8.2, 1.8.6, 1.8.11-1.8.14), 1.10
		2	2.5 - 2.7
		3	3.2, 3.4
II	1	4	4.6, 4.8 - 4.10, 4.12, 4.13,4.14 (4.14.1, 4.14.2)
III	1	5	5.1-5.13
IV	1	7	7.1-7.8, 7.10, 7.11
V	1	9	9.1-9.3, 9.6, 9.10-9.12, 9.14

REFERENCE BOOKS

1. Jain Anil K. (2015). *Fundamentals of digital image processing*, 1st Edition, Pearson Education, India.
2. Kenneth R. Castleman. (2007).*Digital image processing*, 2nd Edition, Pearson Education, India.
3. Pratt William K. (2007). *Digital image processing*, 4th Edition, John Wiley.

Course Code 23UCSE61	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	1	1	3	1	1	1	2	2	2	-
CO2	2	1	3	2	2	2	2	3	2	-
CO3	3	3	2	2	3	2	2	2	2	-
CO4	2	2	2	2	1	3	3	3	1	-
CO5	3	3	2	3	3	3	3	3	1	1

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

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B.Sc. COMPUTER SCIENCE

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Semester VI	**CRYPTOGRAPHY**	Hours/Week: 5	
Elective Course - 9		Credits: 4	
Course Code **23UCSE62**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: define the fundamental concepts of network security and its architecture. [K1]

CO2: discuss symmetric, asymmetric and public-key cryptography. [K2]

CO3: summarize the principles of firewalls and intrusion detection systems. [K2]

CO4: apply classical encryption techniques to encrypt and decrypt messages. [K3]

CO5: implement the algorithm and virus counter measures to protect systems from malicious attacks. [K3]

UNIT I

INTRODUCTION: Services, Mechanisms and Attacks - The OSI Security Architecture – A Model for Network Security. (15 Hours)

UNIT II

CLASSICAL ENCRYPTION TECHNIQUES: Symmetric Cipher Model: Cryptography, Cryptanalysis - Substitution Techniques: Caesar Cipher, Monoalphabetic Ciphers, Playfair Cipher, Polyalphabetic Ciphers, One-Time Pad - Transposition Techniques – Steganography. (15 Hours)

UNIT III

BLOCK CIPHERS AND THE DATA ENCRYPTION STANDARD: Block Cipher Principles – The Data Encryption Standard – The Strength of DES – **PUBLIC-KEY CRYPTOGRAPHY AND RSA:** The RSA Algorithm. (15 Hours)

UNIT IV

IP SECURITY: IP Security Overview - IP Security Architecture – Authentication Header. **WEB SECURITY:** Secure Sockets Layer and Transport Layer Security – Secure Electronic Transaction. (15 Hours)

UNIT V

INTRUDERS: Intruders – Intrusion Detection – Password Management – **MALICIOUS SOFTWARE:** Viruses and Related Threats – Virus Countermeasures – **FIREWALLS:** Firewall Design Principles – Trusted Systems. (15 Hours)

SELF-STUDY: (Not included for Examination)

Hill Cipher (Pages: 37-40)

TEXT BOOK

William Stallings. (2002). *Cryptography and Network Security Principles and Practices*, 3rd Edition, Pearson.

UNIT	CHAPTERS	SECTIONS
I	**1**	**1.1 – 1.3**
II	**2**	**2.1 – 2.3, 2.5**
III	**3**	**3.2 - 3.4**
	9	**9.2**
IV	**16**	**16.1-16.3**
	17	**17.2, 17.3**
V	**18**	**18.1-18.3**
	19	**19.1, 19.2**
	20	**20.1, 20.2**

REFERENCE BOOKS

1. Behrouz A. Foruzan. (2007). *Cryptography and Network Security*, 1st Edition, Tata McGraw-Hill, India.
2. AtulKahate. (2003). *Cryptography and Network Security*, 2nd Edition, Tata McGraw-Hill, India.
3. M.V. Arun Kumar. (2011). *Network Security*, 1st Edition, Laxmi Publications, India.

WEB RESOURCES

1. https://www.tutorialspoint.com/cryptography/
2. https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography

Course Code 23UCSE62	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	2	2	1	1	1	1	3	2	-	-
CO2	2	2	2	2	1	1	2	2	-	-
CO3	3	2	1	3	2	1	2	2	2	2
CO4	3	2	3	3	2	3	2	2	2	2
CO5	3	2	3	3	2	3	2	3	2	2

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

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Semester VI	**IMAGE PROCESSING PRACTICAL**	Hours/Week: 5	
Elective Course -10 Practical - II		Credits: 3	
Course Code **23UCSE63P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: explain the basic concepts of image processing, including image representation, color models, and spatial resolution. [K2]

CO2: describe various image filtering and segmentation techniques, including low-pass and high-pass filtering, edge detection, and region-based segmentation. [K2]

CO3: enter and execute the code with proper image input. [K3]

CO4: implement various image transformation and conversion techniques, including image scaling, rotation, and color space conversion. [K3]

CO5: apply various image enhancement techniques, including histogram equalization, contrast stretching, and spatial filtering. [K3]

Write Programs for the following concepts:

1 To work with color spaces

i. Separate color image in three R G & B planes

ii. Create color image using R, G and B three separate planes

iii. Separate color image in three C M&Y planes

iv. Separate color image in three H S&I planes

v. Convert given color/gray-scale image into black & white image

2 Arithmetic Operations on Images

i. Addition of two images

ii. Subtract one image from other image

iii. Calculate mean value of image

iv. Different Brightness by changing mean value

3 Conversion between color spaces

i. RGB to Grayscale conversion with and without using function

ii. RGB to HSI conversion

4 Basic morphological operations
5 Histogram equalization
6 Intensity transformation of images
7 2-D DFT analysis of images
8 2-D DCT analysis of images
9 DWT of images
10 To perform Image transforms
   i. Walsh transform
   ii. Hadamard transform
   iii. DCT transform
   iv. Haar transform
11 To display Bit planes of an Image
12 Image enhancement using spatial filtering
13 Image enhancement using filtering in frequency domain
14 Region based segmentation
15 Segmentation using watershed transformation
16 To perform Image segmentation
   i. edge detection
   ii. line detection
   iii. point detection
17 Image compression techniques

Course Code 23UCSE63P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	2	3	2	2	2	2	2	2	-
CO2	3	3	3	2	2	2	2	3	2	-
CO3	3	3	2	2	3	2	2	2	2	-
CO4	3	2	2	2	2	3	3	3	2	1
CO5	3	3	2	3	3	3	3	3	2	1

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

Dr. K. Annbuselvi
Mrs. P. Aruna Devi
Heads of the Departments

Dr. R. Barani
Mrs. V. Subhasini
Course Designers

V.V.VANNIAPERUMAL COLLEGE FOR WOMEN
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An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
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VIRUDHUNAGAR
Quality Education with Wisdom and Values

B.Sc. COMPUTER SCIENCE
(for those who join in 2023 - 2024)

Semester VI	**CRYPTOGRAPHY PRACTICAL**	Hours/Week: 5	
Elective Course -10 Practical - II		Credits: 3	
Course Code **23UCSE64P**		Internal 40	External 60

COURSE OUTCOMES

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

CO1: understand the basic cryptographic operations such as XOR, AND, and bitwise manipulation for text encoding. [K2]

CO2: illustrate the concepts of symmetric and asymmetric encryption techniques. [K2]

CO3: demonstrate encryption and decryption algorithms. [K3]

CO4: implement programs using substitution and transposition techniques. [K3]

CO5: design and develop software applications incorporating secure encryption methods. [K3]

Write C/Java program to implement the following

1. XOR each character in string with 0 and displays the result.
2. AND and XOR each character in the string with 127 and display the result.
3. Caesar Cipher technique.
4. Shift Cipher technique.
5. Caesar Cipher technique.
6. Vigenere Cipher technique.
7. Play fair Cipher technique.
8. Hill Cipher technique.
9. Rail fence Cipher technique.
10. Row - Columnar Transformation
11. DES algorithm.
12. RSA algorithm.
13. Blowfish algorithm.

Course Code 23UCSE64P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO7
CO1	2	2	1	1	2	2	2	2	-	-
CO2	3	2	1	2	2	2	2	2	-	-
CO3	3	3	2	2	3	3	2	2	1	-
CO4	3	3	2	2	3	3	2	2	1	-
CO5	3	3	2	2	3	3	2	2	-	-

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

Dr. K. Annbuselvi
Mrs. P. Aruna Devi
Heads of the Departments

Mrs. S. Rajapriya
Mrs. M. Suguna
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Semester VI	**MULTIMEDIA SYSTEMS**	Hours/Week: 2	
SEC - 7		Credits: 2	
Course Code **23UCSS61**		Internal 25	External 75

COURSE OUTCOMES

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

CO1: describe the basic concepts and tools in multimedia design. [K1]

CO2: recognize various multimedia file formats and processes used in creating and delivering multimedia content. [K1]

CO3: infer the role of different multimedia elements such as text, images, sound, animation, and video, and explain how they are correlated in multimedia projects. [K2]

CO4: discuss the various technologies involved in production process of multimedia projects.[K2]

CO5: apply multimedia development tools and techniques to create functional and interactive multimedia systems. [K3]

UNIT I

Multimedia: Definitions – Use of Multimedia - Delivering Multimedia. **Text:** About Fonts and Faces - Using Text in Multimedia - Font Editing and Design Tools - Hypermedia and Hypertext. (6 Hours)

UNIT II

Images: Making Still Images - Color – Image File Formats. **Sound:** The Power of Sound - Digital Audio - MIDI Audio – MIDI vs. Digital Audio - Multimedia System Sounds - Audio File Formats. (6 Hours)

UNIT III

Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. **Video:** Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video. (6 Hours)

UNIT IV

Making Multimedia: The Stage of Multimedia Project – What you need: The Intangible – What you need: Hardware – What you need: Software – What you need: Authoring Systems. **Multimedia Skills:** The Team. (6 Hours)

UNIT V

Planning and Costing: Scheduling – Estimating. **Designing and Producing:** Designing – Producing. **Content and Talent:** Acquiring Content - Acquiring Talent. (6 Hours)

SELF-STUDY: (Not included for Examination)

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

TEXT BOOK

Tay Vaughan. (2011). *Multimedia making it work*, 8th Edition, Tata McGraw Hill.

UNIT	CHAPTERS	Pages
I	1	1 - 12
	2	22 – 40, 50 - 60
II	3	70 - 97
	4	104 - 123
III	5	140 - 157
	6	173 – 190
IV	7	196 - 234
	8	241 - 254
V	9	273 – 280
	10	295 – 323
	11	331 - 342, 347 - 352

REFERENCE BOOKS

1. Ralf Steinmetz, Klara Nahrstedt. (2012). *Multimedia Computing, Communication & Applications*, 1st Edition, Pearson Education.
2. Ranjan Parekh. (2013). *Principles of Multimedia*, 2nd Edition, McGraw Hill Education Private Limited, India.
3. Ralf Steinmetz, Klara Nahrstedt. (2004). *Multimedia Systems*, Springer-Verlag Berlin and Heidelberg GmbH & Co. K.

WEB RESOURCE

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

Course Code 23UCSS61	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	2	2	2	1	1	2	2	2	-
CO2	3	2	2	2	1	1	3	2	2	-
CO3	3	2	2	2	2	2	3	2	3	-
CO4	3	2	3	2	2	2	3	2	3	-
CO5	3	3	3	2	3	2	3	2	3	1

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

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Course Designers