MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

(An Autonomous College)

Affiliated to Periyar University, Salem | Accredited by **NAAC** with '**A**' Grade

Recognized by **UGC** under Section 2(f) & 12 (B)

MUTHAYAMMAL
COLLEGE OF ARTS
AND SCIENCE
(Autonomous)
A UNIT OF VANETRA GROUP
Learn.
Lead

ESTD-1994

DEGREE OF BACHELOR OF SCIENCE

Learning Outcomes - Based Curriculum Framework

- Choice Based Credit System

Syllabus for B.C.A., Computer Application

(Semester Pattern)

(For Candidates admitted from the academic year 2023-2024 and onwards)

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Vision:

To redefine the scope of higher education by infusing into each of our pursuits, initiatives that will encourage intellectual, emotional, social and spiritual growth, there by nurturing a generation of committed, Knowledgeable and socially responsible citizens.

Mission:

*To Ensure State of the world learning experience

*To espouse value based Education

*To empower rural education

*To instill the sprite of entrepreneurship and enterprise

*To create are source pool of socially responsible world citizens

QUALITY POLICY

To Seek–To Strive–To Achieve greater heights in Arts and Science, Engineering, Technological and Management Education without compromising on the Quality of Education.

DEPARTMENT OF COMPUTER APPLICATION

Vision:

* To attain global recognition in the computer science and applications, research And training to meet the growing needs of an Industry and Society.

Mission:

* To impart quality education
* To develop Industry-Academia relationship
* To provide State-of-art research facility
* To train various technologies in the thrust areas of computer science and applications.

PREAMBLE

Bachelor of Computer Applications (BCA) is a 3 – Year under Graduate Programme Spread over six semesters. The Course is designed to bridge the gap between IT industries and Academic institutes by incorporating the latest development, into the Curriculum and to give students a complete understanding within a structured framework. The Course helps the students to build-up a successful Career in Computer Science and for pursuing higher studies in Computer Science. This Bachelor of Computer Applications (B.C.A.) course is designed to provide the student with a comprehensive understanding of computer applications, covering a wide array of foundational concepts and practical skills. In the B.C.A. program, students will explore the fundamental principles of Computer Science, Programming Languages, Database Management, Software Development, and more. This curriculum is crafted to equip the students with the knowledge and skills necessary to excel in the ever-evolving field of computer applications. From building a strong foundation in programming to gaining insights into system analysis and design, the B.C.A. program will prepare the students for a successful career in the dynamic and diverse world of IT.

PROGRAMME LEARNING OUTCOME

i) To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis.
ii) Identify applications of Computer Science in other fields in the real world to enhance the career prospects.
iii) Realize the requirement of lifelong learning through continued education and research.
iv) Use the concepts of best practices and standards to develop user interactive and abstract application.
v) Understand the professional, ethical, legal, security, social issues and responsibilities.

NATURE AND EXTENT OF THE PROGRAMME

The undergraduate programme in BCA is the first level of college or university degree in the country as in several other parts of the world. After obtaining this degree, a Computer technician may enter into the job market or opt for undertaking further higher studies in the subject. After graduation the students may join IT industry, BPO Sector, or Banking Sector and play their role as Software Engineer in a

useful manner contributing their knowledge to the welfare of the society. Thus the undergraduate level degree in BCA must prepare the students for all these objectives. The LOCF curriculum has been developed encompassing all the diversified aspects of Computer Application with reasonable depth of knowledge and skills as to specialize them in the various aspects of the subject. It also equips them with the expected professional expertise.

AIM OF THE PROGRAMME

The aim of the undergraduate degree in BCA is to make students knowledgeable about the various basic concepts in a wide ranging context which involve the use of knowledge and skills of Computer Application. Their understanding, knowledge and skills in Computer field needs to be developed through a thorough teaching learning process in the class, practical skills through the laboratory work, their presentation and articulation skills, exposure to industry and interaction with industry experts.

GRADUATE ATTRIBUTES

Bachelor of Computer Applications (BCA) encompass a comprehensive skill set tailored to meet the demands of the digital age. BCA graduates are equipped with foundational knowledge in computer science, including programming languages such as C, C++, Java, and Python. They possess a strong understanding of data structures, algorithms, and software development methodologies, enabling them to design and develop efficient and scalable applications. Proficiency in database management systems (DBMS) and web technologies equips them to handle data effectively and develop dynamic web applications. Ethical considerations are integral to their education, with an understanding of professional ethics in software development and data management. They are prepared to navigate ethical challenges in technology, ensuring responsible use of information and adherence to legal standards. Furthermore, BCA programs emphasize continuous learning and adaptation to evolving technologies, instilling a mindset of lifelong learning. Graduates are poised to contribute effectively to the IT industry, equipped with the skills and attributes needed to thrive in various roles such as software developers, system analysts, and technology consultants.

GA 1 Analytical Reasoning
GA 2 Critical Thinking
GA 3 Problem Solving Skills
GA 4 Communication Skills
GA 5 Leadership Quality
GA 6 Team work
GA 7 Lifelong Learning

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Graduates will be able to promote learning environment to meet the industry expectation

PEO2: Graduates will be incorporated the critical thinking with Good Communication and Leadership skills to become a self-employed

PEO3: Graduates will be up hold the human values and environmental sustenance for The betterment of the society.

PROGRAMME OUTCOMES (POs)

PO1: Graduates will acquire dynamic skills through proper perception of the course Objectives that leads to scientific and analytical comprehension of the concepts.

PO2: Graduates will focus on sustainable goals that might bring about spherical developments

PO3: Graduates will infuse a spirit converging on bricking a team work, interpersonal and administrative skills to think critically and execute effectively

PO4: Graduates will apply reasoning appropriately to scale the humps in learning And solute them to the core.

PO5: Graduates will engage the skills obtained in independent and collaborative Learning as a perennial process.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO-1: To Recognize the Students career with necessary skills in the area related to Computer Applications.

PSO-2: To Exemplifying the emerging technologies and provide innovative solutions to real-life Applications.

PSO-3: To Execute the career in corporate sectors.

PSO-4: To organize a concrete foundation and enrich the abilities to qualify for Employment, Higher Studies and Research in Computer Application and Data science with ethical values.

PSO-5: To Build the student Career in Public sector, Government organizations and Educational Sectors.

REGULATIONS (2023 - 2024)

1. DURATION OF THE PROGRAME

1.1. Three years(six semesters)

1.2. Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to May of each year.

1.3. There shall be not less than 90 working days for each semester.

2. ELIGIBILITY FOR ADMISSION

2.1. A candidate who has passed in Higher Secondary Examination with Mathematics or Information Technology or computer Technology or Business Mathematics or Computer Science or Statistics or Computer Applications (Academic stream or Vocational stream) as one of the subject under Higher Secondary Board of Examination, Tamilnadu as per norms set by the Government of Tamilnadu.

3. CREDIT REQUIRMENTS AND ELIGIBILITY FORAWARD OF DEGREE

3.1. A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years and passed the examinations of all the Six Semesters prescribed earning a minimum of 140 credits as per the distribution given in Regulation for Part I, II, III, IV & V and also fulfilled such other conditions as have been prescribed thereof.

4. COURSE OF STUDY,CREDITS AND SCHEME OF EXAMINATION

4.1. The Course Components and Credit Distribution shall consist of the following:(Minimum Number of Credits to be obtained)

Part Wise Distribution	Study Components	Credit Distribution
PART I	Tamil or Other Languages	**12**
PARTII	English	**12**
PARTIII	Core, Allied, Elective and Project Courses	**91**
PART IV	i. Basic Tamil/Advanced Tamil/NME	**04**
	ii. Soft Skill Courses/SBEC	**10**
	iii. Environmental Studies	**02**
	iv. Value Education	**02**
	v. Internship	**02**
	vi. Foundation Course	**02**
	vii. Professional Competency Skills	**02**
PART V	Extension Activity	**01**
Total Credits		140

4.2 DETAILS OF COURSE OF STUDY OF PARTS I–V

4.2.1 PART I: Tamil and Other Languages Hindi or French at the option of candidates and according to the syllabus and text-books prescribed from time to time.

4.2.2 PART II: English: According to the syllabus and text-books prescribed from time to time.

4.2.3 PART III: Core, Allied Project and Elective Courses: As prescribed by the concerned Board of Studies

4.2.4 PARTIV:

i. Basic Tamil/Advanced Tamil/NME:

a. Students who have not studied Tamil up to XII STD and have taken any Language other than Tamil in Part I shall take Basic Tamil comprising of Two Courses (level will be at 6thStandard).
b. Students who have studied Tamil up to XII STD and have taken any Language other than Tamil in Part – I shall take Advanced Tamil comprising of Two Courses.
c. Students who have studied Tamil up to XII STD and also have taken Tamil in Part–I shall take Non-Major Elective comprising of Two Courses.
    i. Soft Skill Courses/SBEC
    ii. Environmental Studies
    iii. Value Education
    iv. Internship
    v. Foundation Course
    vi. Professional Competency Skills(Online)

4.2.5 PART V: Extension Activity:

Students shall be awarded a maximum of 1 Credit for Compulsory Extension Service. All the Students shall have to enroll for NSS /NCC/ NSO (Sports & Games) Retract / Youth Red Cross or any other Service Organizations in the College and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the College before 31st March in a year. If a student lacks 40 hours attendance in the first year, he or she shall have to compensate the same during the subsequent years.

Those students who complete minimum attendance of 40 hours in one year will get 'half-a- credit and those who complete the attendance of 80 or more hours in Two Years will get 'one credit'. Literacy and Population Education and Field Work shall be compulsory components in the above extension service activities.

4.3. Inclusion of the Massive Open Online Courses (MOOCs) available on SWAYAM and NPTEL

4.3.1 Students can choose the MOOC Course Available on SWAYAM and NPTEL under Core, Elective or Soft skill category. He/ she will be awarded degree only after producing valid certificate of the MOOC course for credit Mobility.

5. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

5.1 Eligibility: Students shall be eligible to go to subsequent semester only if they earn sufficient attendance as prescribed by the Periyar University.

5.2. Attendance: All Students must earn 75% and above of attendance for appearing for the End Semester Examination (Theory/Practical).

5.3. Condonation of shortage of attendance: If a Student fails to earn the minimum attendance (Percentage stipulated), the Principals shall con done the shortage of attendance up to a maximum limit of 10% (i.e. between 65% and above and less than75%) after collecting the prescribed fee for Theory/Practical examination separately, towards the condonation of shortage of attendance. Such fees collected and should be remitted to the University.

5.4. Non-eligibility for condonation of shortage of attendance: Students who have secured less than 65% but more than 50% of attendance are NOT ELIGIBLE for condonation of shortage of attendance and such Students will not be permitted to appear for the regular examination, but will be allowed to proceed to the next year/next semester of the program and they may be permitted to take next University examination by paying the prescribed condonation fee.

5.5. Detained students for want of attendance: Students who have earned less than 50% of attendance shall not be permitted to proceed to the next semester and to complete the Program of study. Such Students shall have to repeat the semester, which they have missed by rejoining after completion of final semester of the course, by paying the fee for the break of study as prescribed by the College from time to time.

5.6. Condonation of shortage of attendance for married women students: In respect of married women students undergoing UG programs, the minimum attendance for condonation (Theory/Practical) shall be relaxed and prescribed as 55% instead of 65% if they conceive during their academic career. Medical certificate from the Doctor (D.G.O) from the Government Hospital and the prescribed fee along with attendance details shall be forwarded to the college to consider the condonation of attendance mentioning the category.

5.7. Zero Percent (0%) Attendance: The Students, who have earned 0% of attendance, have to repeat the program (by rejoining) without proceeding to succeeding semester and they have to obtain prior permission from the College/University immediately to rejoin the program.

5.8 Transfer of Students and Credits: The strength of the credits system is that it permits inter Institutional transfer of students. By providing mobility, it enables individual students to develop their capabilities fully by permitting them to move from one Institution to another in accordance with their aptitude and abilities by obtaining necessary permission from the university.

5.8.1 Transfer of Students is permitted from one Institution to another Institution for the same program with same nomenclature.

Provided, there is a vacancy in the respective program of Study in the Institution where the transfer is requested.

Provided the Student should have passed all the courses in the Institution from where the transfer is requested.

5.8.2 The marks obtained in the courses will be converted and grades will be assigned as per the College norms.

5.8.3 The transfer students are eligible for classification.

5.8.4 The transfer students are not eligible for Ranking, Prizes and Medals.

5.8.5 Students who want to go to foreign Universities up to two semesters or Project Work with the prior approval of the Departmental/College Committee are allowed to get transfer of credits and marks which will be converted in to Grades as per the University norms and are eligible to get CGPA and Classification; they are not eligible for Ranking, Prizes and Medals.

5.9 Students are exempted from attendance requirements for online courses of the College and MOOC's.

6. EXAMINATION AND EVALUATION

6.1. Register for all subjects: Students shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination. For this purpose, Students shall register for all the arrear subjects of earlier semesters along with the current (subsequent) Semester Subjects.

6.2. Marks for Internal and End Semester Examinations for PART I, II, III, and IV

Category	Theory	Practical
Internal Assessment	**25**	**40**
End semester Examination	**75**	**60**

6.3. Procedure for Awarding Internal Marks Internal Examination Marks–Theory

Components	Marks
CIAI&II	**15**
Attendance	**5**
Assignment/Quiz	**5**
Total	**25**

6.4 Awarding Marks for Attendance(out of 5)

Percentage of Attendance	Marks
Below 60%	0marks
60% to 75%	3marks
75% to 90%	4marks
Above 90%	5marks

6.5 Components for Practical CIA.

Components	Marks
CIA–I	**15**
CIA- II	**15**
Observation Note	**05**
Attendance	**5**
Total	**40**

6.6 Components for Practical ESE.

Components	Marks
Completion of Experiments	**50**
Record	**05**
Viva voce	**05**
Total	**60**

6.7 Guidelines for Value Education Yoga and Environmental Studies(Part IV)

6.7.1. The Course Value Education Yoga is to be treated as 100% CIA course which is offered in V Semester for I year UG students.

6.7.2. The Course Environmental Studies is to be treated as 100% CIA course which is offered in IV Semester for I year UG students.

6.7.3 Total Marks for the Course =100

Components	Marks
Two Tests(2x30)	**60**
Field visit and report (10+10)	**20**
Two Assignments(2x10)	**20**
Total	**100**

The passing minimum for this course is 40%

6.7.3 In case, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent odd/even semesters.

6.8 Internship/Industrial Training, Mini Project and Major Project Work

Internship/ Industrial Training		Mini Project	Major		Project Work
Components	**Marks**	**Marks**	**Components**		Marks
CIA*2			**CIA**		**40**
Work Diary	25	-	a) Attendance	10Marks	
Report	50	50			
Viva–voce	25	50	**b)** Review /Work Diary*1	30Marks	
Examination					
Total	**100**	**100**	**ESE*2**		
			a) Final Report - 40Marksb)Viva – voce - 20Marks		**60**
			Total		
					100

*1. Review is for Individual Project and Work Diary is for Group Projects (Group consisting of minimum 3 and maximum 5)

*2. Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

6.9 Guide lines for Professional Competency Skill-Online Mode(Part IV)- Online Exam 3 hours

Components	Marks
100 Objective Type Questions 100*1=100 Marks	**100**

Objective type Questions from Question Bank.

- The passing minimum for this paper is 40%
- In case, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent semesters.

QUESTION PAPER PATTERN FOR CIA I, II AND ESE	
(3 HOURS)	**MAXIMUM:75 Marks**
SECTION-A (**Objective Type**) **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(10x1=10 marks)
SECTION-B **(Either or Type)** **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(5x5=25 marks)
SECTION-C **(Either or Type)** **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(5x8=40 marks)
(Syllabus for CIA - I 2.5 Unit, Syllabus for CIA – II All 5 Unit)	

6.10 PASSING MINIMUM

6.10.1. There shall be no passing minimum for Internal.

6.10.2. For external examination, passing minimum shall be 40% [Forty Percentage] of the maximum marks prescribed for the course for each Course/ Practical/ Project and Viva-Voce.

6.6.2 In the aggregate[External/Internal] the passing minimum shall be of 40%.

6.6.3 He /She shall be declared to have passed the whole examination, if He /she passes in all the Courses and Practical wherever prescribed as per the scheme of the examinations by earning 140 CREDITS in Part I, II, III, IV& V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 credit to qualify for the Degree.

6.11 SUPPLIMENTARY EXAMINATION:

Supplementary Examinations is conducted for the students who appeared in the final semester examinations. Eligible criteria for appearing in the Supplementary Examinations are as follows:

6.11.1. Eligibility: A Student who is having arrear of only one theory course in any of the semester or two theory course in the Final semester of the UG degree programme alone is eligible for Supplementary Examinations.

6.11 .2 Non-eligibility for those completed the program: Students who have completed their Program duration but having arrears are not eligible to appear for Supplementary Examinations.

6.12 RETOTALLING, REVALUATION AND PHOTOCOPY OF THE ANSWER SCRIPTS:

6.12.1. Re-totaling: All UG Students who appeared for their Semester Examinations are eligible for applying for re-totaling of their answer scripts.

6.12.2. Revaluation: All current batch Students who have appeared for their Semester Examinations are eligible for Revaluation of their answer scripts. Passed out candidates are not eligible for Revaluation.

6.12.3. Photo copy of the answer scripts: Students who have applied for revaluation can apply for the Photocopy of answer scripts by paying prescribed fee.

7. CLASSIFICATION OF SUCCESSFUL STUDENTS

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90-100	9.0 - 10.0	O	**Outstanding**
80-89	8.0 - 8.9	D+	**Excellent**
75-79	7.5 - 7.9	D	**Distinction**
70-74	7.0 - 7.4	A+	**Very Good**
60-69	6.0 - 6.9	A	**Good**
50-59	5.0 - 5.9	B	**Average**
40-49	4.0 - 4.9	C	**Satisfactory**
00-39	0.0	U	**Re-appear**
ABSENT	0.0	AAA	**ABSENT**

7.1 Computation of Grade Point Average (GPA) in a Semester, Cumulative Grade Point Average (CGPA) and Classification GPA for a Semester:=∑iCiGi,∑iCi

That is, GPA is the sum of the multiplication of grade points by the credits of the courses divided by the sum of the credits of the courses in a semester.

CGPA for the entire programme: = ∑n∑iCniGni ,∑n∑iCni That is, CGPA is the sum of the multiplication of grade points by the credits of the entire programme divided by the sum of the credits of the courses of the entire programme.

Where,

Ci = Credits earned for course I in any semester,

Gi = Grade Points obtained for course in any semester =Semester in which such courses were credited.

7.2 Letter Grade and Classification

CGPA	GRADE	CLASSIFICATION OFFINAL RESULT
9.5 - 10.0	O+	**First Class - Exemplary***
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	**First Class with Distinction***
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	**First Class**
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	**Second Class**
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C+	**Third Class**
4.0 and above but below 4.5	C	
0.0 and above but below 4.0	U	**Re-appear**

- The Students who have passed in the first appearance and within the prescribed semester of the UG Programme (Major, Allied and Elective courses only) are eligible.

8. RANKING

Students who pass all the examinations prescribed for the Program in the FIRST APPEARANCE IT SELF ALONE are eligible for Ranking I, II and III.

9. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAM TO QUALIFY FOR ADEGREE

9.1. A Student who for whatever reasons is not able to complete the program within the normal period (N) or the Minimum duration prescribed for the programme, may be allowed two years period beyond the normal period to clear the backlog to be qualified for the degree.(Time Span=N+2 years for the completion of programme).

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (Autonomous)

BCA - Abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards

Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

S.No	Study Components	Part	Sem I		Sem II		Sem III		Sem IV		Sem V		Sem VI		No.of Courses	Total Credit
			No.of Course	Credit	No.of Course	Credit	No.of Course	Credit	No.of Course	Credit	No.of Course	Credit	No.of Course	Credit		
1	LANGUAGE - I	I	1	3	1	3	1	3	1	3					4	12
2	LANGUAGE - II	II	1	3	1	3	1	3	1	3					4	12
3	DISCIPLINE SPECIFIC COURSE (DSC)-THEORY	III	1	5	1	5	1	5	1	5	2	10	2	10	8	40
4	DSC - PRACTICAL	III	1	3	1	2	1	3	1	3	2	4	1	3	7	18
5	GENERIC ELECTIVE COURSES(GEC)-THEORY	III	1	3	1	3	1	3	1	3					4	12
6	GEC PRACTICAL	III													0	0
7	DISCIPLINE SPECIFIC ELECTIVE COURSES(DSE)	III									2	8	2	9	4	17
8	PROJECT WORK	III											1	4	1	4
9	INTERNSHIP	IV									1	2			1	2
10	PROFESSIONAL COMPETENCY SKILL	IV											1	4	1	4
11	SKILL ENHANCEMENT COURSES(SEC)-SBEC	IV			1	2	1	2	2	4					4	8
12	NON MAJOR ELECTIVE COURSES (NMEC)	IV	1	2	1	2									2	4
13	ABILITY ENHANCEMENT COMPULSORY COURSES(AECC) -EVS	IV							1	2					1	2
14	ABILITY ENHANCEMENT COMPULSORY COURSES(AECC) - VALUE EDUCATION - YOGA	IV									1	2			1	2
15	FOUNDATION COURSE	IV	1	2											1	2
16	EXTENSION ACTIVITY	V											1	1	1	1
	Cumulative Credits		**7**	**21**	**7**	**20**	**6**	**19**	**8**	**23**	**8**	**26**	**8**	**31**	**44**	**140**

Total No. of Subjects	**44**
Marks	**4300**

PART	No. of Credits
PART - I	12
PART - II	12
PART - III	91
PART - IV	24
PART - V	1
Grand Total	**140**

Extra Credit(2+2)	**4**
Grand Total	**144**

S.No	PART	STUDY COMPONENTS	COURSE CODE	TITLE OF THE COURSE	Hrs./W		CREDIT POINTS	MAX.MARKS		
					Lect	Lab		CIA	ESE	TOTAL
SEMESTER - I										
1	I	LANGUAGE-I	23M1UFTA01	TAMIL - I	6	-	3	25	75	100
2	II	LANGUAGE-II	23M1UFEN01	ENGLISH - I	6	-	3	25	75	100
3	III	DSC THEORY - I	23M1UCAC01	PYTHON PROGRAMMING	5	-	5	25	75	100
4	III	GEC THEORY - I	23M1UMAA03	DISCRETE MATHEMATICS - I	4	-	3	25	75	100
5	III	DSC PRACTICAL - I	23M1UCAP01	PRACTICAL : PYTHON PROGRAMMING	-	5	3	40	60	100
6	IV	NMEC - I			2	-	2	25	75	100
7	IV	FC - I	23M1UCAFC1	STRUCTURED PROGRAMMING IN C	2	-	2	25	75	100
				TOTAL	**25**	**5**	**21**	**190**	**510**	**700**
SEMESTER - II										
1	I	LANGUAGE - I	23M2UFTA02	TAMIL - II	6	-	3	25	75	100
2	II	LANGUAGE - II	23M2UFEN02	ENGLISH - II	6	-	3	25	75	100
3	III	DSC THEORY - II	23M2UCAC02	OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++	5	-	5	25	75	100
4	III	GEC THEORY - II	23M2UMAA04 / 23M2UMAA08	DISCRETE MATHEMATICS – II/ NUMERICAL METHODS	4	-	3	25	75	100
5	III	DSC PRACTICAL - II	23M2UCAP02	PRACTICAL : PROGRAMMING IN C++	-	5	2	40	60	100
6	IV	NMEC - II			2	-	2	25	75	100
7	IV	SEC THEORY - I			2	-	2	25	75	100
				TOTAL	**25**	**5**	**20**	**190**	**510**	**700**

SEMESTER - III										
1	I	LANGUAGE - I	23M3UFTA03	TAMIL - III	6	-	3	25	75	100
2	II	LANGUAGE - II	23M3UFEN03	ENGLISH - III	6	-	3	25	75	100
3	III	DSC THEORY - III	23M3UCAC03	DATA STRUCTURES AND ALGORITHMS	5	-	5	25	75	100
4	III	GEC THEORY - III	23M3USTA08	STATISTICAL METHODS AND ITS APPLICATIONS - I	5	-	3	25	75	100
5	III	DSC PRACTICAL - III	23M3UCAP03	PRACTICAL : DATA STRUCTURES USING C++	-	5	3	40	60	100
6	IV	SEC THEORY - II			3	-	2	25	75	100
				TOTAL	**25**	**5**	**19**	**165**	**435**	**600**
SEMESTER - IV										
1	I	LANGUAGE - I	23M4UFTA04	TAMIL - IV	6	-	3	25	75	100
2	II	LANGUAGE - II	23M4UFEN04	ENGLISH - IV	6	-	3	25	75	100
3	III	DSC THEORY - IV	23M4UCAC04	PROGRAMMING IN JAVA	5	-	5	25	75	100
4	III	GEC THEORY - IV	23M4USTA09	STATISTICAL METHODS AND ITS APPLICATIONS - II	4	-	3	25	75	100
5	III	DSC PRACTICAL - IV	23M4UCAP04	PRACTICAL : PROGRAMMING IN JAVA	-	5	3	40	60	100
6	IV	SEC THEORY - III			2	-	2	25	75	100
7	IV	SEC THEORY - IV			2	-	2	25	75	100
8	IV	AECC - ENVIRONMENTAL STUDIES*	23M4UEVS01	ENVIRONMENTAL STUDIES	-	-	2	100	-	100
		***SELF STUDY**		**TOTAL**	**25**	**5**	**23**	**290**	**510**	**800**

SEMESTER - V										
1	III	DSC THEORY - V	23M5UCAC05	RDBMS	5	-	5	25	75	100
2	III	DSC PRACTICAL - V	23M5UCAP05	PRACTICAL: RDBMS USING SQL	-	4	2	40	60	100
3	III	DSC THEORY - VI	23M5UCAC06	ASP .NET PROGRAMMING	5	-	5	25	75	100
4	III	DSE THEORY - I		ELECTIVE - I:	5	-	4	25	75	100
5	III	DSE THEORY - II		ELECTIVE - II:	5	-	4	25	75	100
6	III	DSC PRACTICAL - VI	23M5UCAP06	PRACTICAL : ASP .NET PROGRAMMING	-	4	2	40	60	100
7	IV	AECC - VALUE EDUCATION	23M5UVED01	YOGA	2	-	2	100	-	100
8	IV	INTERNSHIP	23M5UCAIS1	INTERNSHIP	-	-	2	100	-	100
				TOTAL	**22**	**8**	**26**	**380**	**420**	**800**
SEMESTER - VI										
1	III	DSC THEORY - VII	23M6UCAC07	COMPUTER NETWORKS	5	-	5	25	75	100
2	III	DSC THEORY - VIII	23M6UCAC08	DATA ANALYTICS USING R PROGRAMMING	5	-	5	25	75	100
3	III	DSE THEORY - III		ELECTIVE - III	5	-	5	25	75	100
4	III	DSE THEORY - IV		ELECTIVE - IV	5	-	4	25	75	100
5	III	DSC PRACTICAL - VII	23M6UCAP07	PRACTICAL : R PROGRAMMING	-	6	3	40	60	100
6	III	PROJECT WORK	23M6UCAPR1	PROJECT WORK	4	-	4	40	60	100
7	IV	PROFESSIONAL COMPETENCY SKILL	23M6UCAOE1	COMPUTER APPLICATION FOR COMPETITIVE EXAMINATION	-	-	4	100	-	100
8	V	EXTENSION ACTIVITY	23M6UEXA01	EXTENSION ACTIVITY	-	-	1	-	-	-
				TOTAL	**24**	**6**	**31**	**280**	**420**	**700**
				OVERALL TOTAL	**146**	**34**	**140**	**1495**	**2805**	**4300**
		EXTRA		EXTRA CREDIT SWAYAM/MOOC ONLINE	-	-	**2**	-	-	-
				VALUE ADDED COURSE	-	-	**2**	-	-	-

HOD **MEMBER SECRETARY ACADEMIC COUNCIL** **PRINCIPAL**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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RASIPURAM - 637408.

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCAC01	**PYTHON PROGRAMMING**	**DSC THEORY - I**	**I**	**5**	**5**		**-**	**5**
Objectives	Students Learn the basic concepts of Python programming. To apply the OOPs concept in PYTHON programming**.**							

Unit	Course Content	Knowledge Levels	Sessions
I	**Basics of Python Programming**: History of Python - Features of Python - Literal – Constants - Variables – Identifiers – Keywords-Built- in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions - Type conversions. Python Arrays: Defining and Processing Arrays – Array methods.	K1	12
II	**Control Statements:** Selection / Conditional Branching statements: if, if-else, nested if and if- else if - else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.	K2	12
III	**Functions:** FunctionDefinition – FunctionCall – Variable Scope and its Lifetime - Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace –Defining our own modules.	K3	12
IV	**Lists**: Creating a list -Access values in List-Updating values in Lists- Nested lists -Basic list operations - List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples – Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	K4	12
V	**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods - append() method – read() and readlines() methods –with keyword – Splitting words – File methods - File Positions - Renaming and deleting files.	K4	12
	CO1: Define the basics of python, Do simple programs on python, Learn how to use an array.	**K1**	

Course Outcome	**CO2:** Illustrate the program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	**K3**
	CO3: Apply the Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	**K2**
	CO4: Inspect with List, tuples and dictionary, Write program using list, tuples and dictionary.	**K4**
	CO5: Discover files in python, Concept of reading and writing files, creating programs using files.	**K4**

Learning Resources	
Text Books	1. ReemaThareja, —Python Programming using problem solving approach‖, First Edition, 2017, Oxford University Press. 2. Dr. R. NageswaraRao, —Core Python Programming‖, First Edition, 2017, Dream tech Publishers.
Reference Books	1. VamsiKurama, —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
Website Link	1. https://www.programiz.com/python-programming 2. https://www.guru99.com/python-tutorials.html 3. https://www.w3schools.com/python/python_intro.asp

	L-Lecture	**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCAC01	**PYTHON PROGRAMMING**		**DSC THEORY - I**		**I**	**5**	**5**	**-**	**-**	**5**

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.K.Vijayakumar	**HoD – Dr.V.Vijayadeepa**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards							
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**P**	**C**
23M1UCAP01	**PYTHON PROGRAMMING**	**DSC PRACTICAL - I**	**I**	**5**	**-**	**5**	**3**
Objective	Students Understand the concept Python applications. Be able to create loops and decision statements in Python.						

S.No	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Program using variables, constants, I/O statements in Python.	K1	5
2	Program using Operators in Python.	K1	5
3	Program using Conditional Statements.	K2	4
4	Program using Loops.	K2	4
5	Program using Functions.	K3	4
6	Program using Recursion.	K3	4
7	Program using Arrays.	K4	4
8	Program using Strings.	K4	4
9	Program using Lists.	K4	4
10	Program using Tuples.	K4	5
11	Program using Dictionaries.	K4	5
12	Program for File Handling.	K4	4
	CO1: To Recall the syntax rules for numerical constants and variables, data types.	K1	

Course Outcome	**CO2:** To Identify the problem and solve using PYTHON programming techniques.	K2
	CO3: To Identify suitable programming constructs for problem solving.	K3
	CO4: To Analyze various concepts of PYTHON language to solve the problem in an efficient way.	K4
	CO5: To Develop a PYTHON program for a given problem and test for its correctness.	K4

Learning Resources	
Text Books	1. ReemaThareja, —Python Programming using problem solving approach‖, First Edition, 2017, Oxford University Press. 2. Dr. R. NageswaraRao, —Core Python Programming‖, First Edition, 2017, Dream tech Publishers.
Reference Books	1. VamsiKurama, —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.
Website Link	1. https://www.programiz.com/python-programming 2. https://www.guru99.com/python-tutorials.html

	L-Lecture	**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCAP01	**PYTHON PROGRAMMING**		**DSC PRACTICAL- I**		**I**	**5**	**-**	**-**	**5**	**3**

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Sample Programs to the related topics
Teaching and Learning Methods	Handling Practical Session Through Projector
Assessment Methods	Observation, Model Practical's

Designed By	Verified By	Approved By
Mrs.N.Padmavathi **Mr.K.Vijayakumar**	**HoD – Dr.V.Vijayadeepa**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCAC02	**OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++**	**DSC THEORY - II**	**II**	**5**	**5**	**-**	**-**	**5**
Objective	Students Learn the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to C++** - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If-else, jump, go to, break, continue, Switch case statements - Loops in C++:for, while, do - functions in C++ - inline functions – Function Overloading.	K1	12
II	**Classes and Objects:** Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.	K2	12
III	**Operator Overloading:** Overloading unary, binary operators – Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	K3	12
IV	**Pointers** – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.	K3	12
V	**Files** – File stream classes – file modes – Sequential Read /	K4	12

	Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions.		
Course Outcome	**CO1:** Define the program structure of C with its syntax and semantics.	**K1**	
	CO2: Illustrate the programming principles in C (data Types, operators, branching and looping, arrays, functions, structures, pointers and files).	**K2**	
	CO3: Apply the programming principles learnt in real time problems.	**K3**	
	CO4: Inspect the programming principles learnt in real Time problems.	**K4**	
	CO5: Discover the Code, debug and test the programs with appropriate test cases.	**K4**	
Learning Resources			
Text Books	E. Balagurusamy, —Object-Oriented Programming with C++, TMH 2013, 7th Edition.		
Reference Books	1.Ashok N Kamthane, —Object-Oriented Programming with ANSI and Turbo C++,Pearson Education 2003. 2.Maria Litvin& Gray Litvin, —C++ for you, Vikas publication 2002.		
Website Link	https://alison.com/course/introduction-to-c-p/us-plus-programming		

L-Lecture	**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M2UCAC02	**OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++**	**DSC THEORY - II**	**II**	**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	M	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	M	M	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.N.Padmavathi Mr.K.Vijayakumar	**HoD – Dr.V.Vijayadeepa**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	P	C
23M2UCAP02	PROGRAMMING IN C++	DSC PRACTICAL - II	II	5	-	5	2

Objective	Students Develop the C++ programming concepts using Classes objects.

S.No.	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Write a C++ program to demonstrate function overloading.	K1	5
2	Write a C++ program to demonstrate Class and Objects.	K1	5
3	Write a C++ program to demonstrate the concept of Passing Objects to Functions.	K2	5
4	Write a C++ program to demonstrate Constructor and Destructor.	K2	6
5	Write a C++ program to demonstrate: a) Single Inheritance b) Multiple Inheritance	K2	6
6	Write a C++ program to manipulate a Text File.	K3	6
7	Write a C++ program to perform Sequential I/O Operations on a file.	K3	6
8	Write a C++ program to find the Biggest Number using Command Line Arguments.	K3	5
9	Write a C++ program to demonstrate Class Template.	K3	5
10	Write a C++ program to demonstrate Function Template.	K4	5

11	Write a C++ program to demonstrate Exception Handling.	K4	6
Course Outcome	**CO1:** Remember the program structure of C with its syntax and semantics.	K1	
	CO2: Illustrate the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files).	K2	
	CO3: Apply the programming principles learnt in real time problems.	K3	
	CO4: Analyze the various methods of solving a problem and choose the best method.	K4	
	CO5: Create Code, debug and test the programs with appropriate test cases.	K4	

Learning Resources	
Text Books	E. Balagurusamy - Object-Oriented Programming with C++", TMH 2013, 7 th Edition.
Reference Books	1. Ashok N Kamthane, - Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003. 2. Maria Litvin & Gray Litvin, - C++ for you‖, Vikas publication 2002.
Website Link	NPTEL & MOOC courses titled Object oriented programming concepts using C++ 1.https://nptel.ac.in/courses/106/105/106105151/ 2.http://www.learn-cpp.org/

L-Lecture	**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCAP02	**PROGRAMMING IN C++**		**DSC PRACTICAL - II**		**II**	**5**	**-**	**-**	**5**	**2**

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Sample Programs to the related topics
Teaching and Learning Methods	Handling Practical Session Through Projector
Assessment Methods	Observation, Model Practical's

Designed By	Verified By	Approved By
Mrs.N.Padmavathi **Mr.K.Vijayakumar**	**HoD – Dr.V.Vijayadeepa**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCAC03	**DATA STRUCTURES AND ALGORITHMS**	**DSC THEORY - III**	**III**	**5**	**5**	**-**	**-**	**5**

Objective	Students learn the concepts of linear and non-linear data structures and implement the various searching and sorting techniques.

Unit	Course Content	Knowledge Levels	Sessions
I	**Algorithms:** Problem solving – Top-Down and Bottom- up approaches to algorithm design – Use of algorithms in problem solving - Efficiency analysis of algorithms: Space, Time complexity and Frequency count. **Data Structure:** Introduction - Definitions – Overview. **Arrays:** Definition – Terminology - Types. **Abstract Data Types (ADTs)** - List ADT - array-based implementation - linked list implementation.	K1	13
II	**Stack ADT** - Operations - Applications-Evaluating arithmetic expressions – Conversion of infix to postfix expression. **Queue ADT** - Operations Circular Queue - Priority Queue - de Queue - applications of queues. **Linked list:** singly linked lists - circular linked lists - doubly linked lists - applications of lists - Polynomial Manipulation - All operations Insertion - Deletion - Merge - Traversal.	K2	12
III	**Tree ADT** - tree traversals - Binary Tree ADT - expression trees - applications of trees - binary search tree ADT - Threaded Binary Trees - AVL Trees - BTree - B+Tree – Heap -Applications of heap.	K3	11

IV	**Graph:** Definition - Representation of Graph - Types of graph - Breadth first traversal – Depth first traversal - Topological sort - Bi - connectivity – Cut vertex Euler circuits -Applications of graphs.	K4	12
V	**Searching**: Linear search - Binary search - **Sorting:** Bubble sort Selection sort - Insertion sort - Shell sort - Radix sort - Hashing - Hash functions Separate chaining - Open Addressing - Rehashing - Extendible Hashing. **Current Trends- *Locality Sensitive Hashing (LSH)***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Recall the concepts of Algorithms and Problem solving.	K1	
	CO2: Summarize the fundamental data structures like arrays,stacks.	K2	
	CO3: Apply the Techniques of queues and linked list.	K3	
	CO4: Examine the different problems related to graphs, trees, and heaps.	K4	
	CO5: Assess the hash function and the concepts of collision and its resolution methods.	K5	

Learning Resources	
Text Books	1.Sathish Jain, Shashi Singh - Data Structure Made Simple, First Edition, BPB Publications, New Delhi, 2006. 2.Debasis Samanta - Classic Data Structures, second Edition, PHI Learning, New Delhi, July 2009. 3.Mark Allen Weiss - Data Structures and Algorithm Analysis in C++,Pearson Education 2014, 4th Edition.
Reference Books	1. Reema Thareja - Data Structures Using C, Oxford Universities Press2014,2nd Edition. 2. Aho, Hopcroft and Ullman - Data Structures and Algorithms, Pearson Education2003.
Website Link	https://www.javatpoint.com/data-structure-tutorial
Self-Study Material	https://www.pinecone.io/learn/series/faiss/locality-sensitive-hashing/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M3UCAC03	**DATA STRUCTURES AND ALGORITHMS**	**DSC THEORY - III**	**III**	**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.K.Vijayakumar	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCAP03	**DATA STRUCTURES USING C++**	**DSC PRACTICAL - III**	**III**	**5**	**-**	**-**	**5**	**3**
Objective	Students Develop the data structure concepts, including Stack and Queue Trees, Graphs, as well as various searching and sorting techniques.							

S.No.	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Implement the List ADT using Arrays.	K1	5
2	Construct the code for following terms and use singly linked list. i) Stack ADT Ii) Queue ADT.	K2	5
3	Develop the code to read an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).	K1	5
4	Implement the priority queue ADT.	K2	5
5	Construct the code for the following operations: i) Insert an element into a binary search tree ii) Delete an element from a binary search tree Iii) Search for a key element in a binary search tree.	K3	5
6	Implement the code for the following operations: i) Insertion into an AVL-tree Ii) Deletion from an AVL-tree.	K4	5
7	Implementation of BFS and DFS for a given graph.	K4	5
8	Construct the code for the following searching methods: i) Linear search ii) Binary search.	K3	5
9	Develop the code for the following sorting methods: i) Selection sort ii) Insertion sort	K5	5

10	Construct the code for the following sorting methods: i) Bubble sort ii) Radix sort	K5	5
Course Outcome	**CO1:** Define the concept of data types, and algorithms.	K1	
	CO2: Identify the basic data structures such as arrays, linked lists, stacks and queues.	K2	
	CO3: Determine the concepts of hash function and its resolution methods.	K3	
	CO4: Categorize the various problems involving trees, heaps and graphs.	K4	
	CO5: Design the Algorithm for solving problems of Searching and Sorting.	K5	

Learning Resources				
Text Books	1. MarkAllen Weiss,— Data Structures and Algorithm Analysis in C++,Pearson Education 2014,4th Edition. 2. Reema Thareja,—Data Structures Using C, Oxford Universities Press2014,2nd Edition.			
Reference Books	1. Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein,—Introduction to Algorithms,McGraw Hill 2009,3rd Edition. 2. Aho,Hopcroft and Ullman,—Data Structures and Algorithms, Pearson Education 2003.			
Website Link	https://www.javatpoint.com/data-structure-tutorial			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M3UCAP03	**DATA STRUCTURES USING C++**	**DSC PRACTICAL - III**	**III**	**5**	**-**	**-**	**5**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Sample Programs to the related topics
Teaching and Learning Methods	Handling Practical Session Through Projector
Assessment Methods	Observation, Model Practical's

Designed By	Verified By	Approved By
Mr.K.Vijayakumar	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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RASIPURAM - 637408.

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCAC04	**PROGRAMMING IN JAVA**	**DSC THEORY - IV**	**IV**	**5**	**5**	**-**	**-**	**5**
Objective	Students Learn the OOPs concepts and get insight real world applications with AWT controls, Event handling and Swing for GUI.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Review of Object Oriented concepts – History of Java - Java buzzwords – JVM architecture – Data types – Variables – Scope and lifetime of variables – arrays – operators – control statements – type conversion and casting – simple java program – constructors – methods – Static block – Static Data – Static Method String and String buffer Classes.	K1	12
II	**Inheritance**: Basic concepts - Types of Inheritance - Member access rules - Usage of this and Super keyword - Method Overloading – Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. **Packages**: Definition – Access Protection – Importing Packages. **Interfaces**: Definition – Implementation – Extending Interfaces. **Exception Handling**: try – catch - throw – throws – finally – Built - in exceptions – Creating own Exception classes.	K2	12
III	**Multithreaded Programming**: Thread Class – Runnable interface – Synchronization – Using synchronized methods – Using synchronized statement – Inter-thread Communication – Deadlock. **I/O Streams:** Concepts of streams – Stream classes – Byte and Character stream –Reading console Input and Writing Console output – File Handling.	K3	12
IV	**AWT Controls:** The AWT class hierarchy – user interface components – Labels – Button – Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Color - Fonts and layout managers. **Event Handling:** Events – Event sources –Event Listeners - Event Delegation Model (EDM) – Handling Mouse and Keyboard Events - Adapter classes - Inner classes.	K4	12
V	**Swing:** Introduction to Swing –Hierarchy of swing components. Containers – Top level containers – Jframe - JWindow - JDialog - JPanel - JButton - JToggleButton – JcheckBox – JradioButton - JLabel, JTextField – JtextArea – Jlist – JcomboBox - JScrollPane. **Current Trends: *Spring Boot***	K5	12
	…….. Self Study		

Course Outcome	**CO1:** Use the syntax and semantics of java programming Language and basic concepts of OOP.		K1	
	CO2: Develop reusable programs using the concepts of Inheritance, polymorphism, interfaces and packages.		K2	
	CO3: Apply the concepts of Multithreading and Exception Handling to develop efficient and error free codes.		K3	
	CO4: Design event driven GUI and web related applications Which mimics the real word scenario.		K4	
	CO5: Build the internet-based dynamic applications using the Concept of applets and swing.		K5	
Learning Resources				
Text Books	Herbert Schildt, The Complete Reference Java 2, Tata McGraw Hill, New Delhi, 7th Edition, 2010. Gary Cornell, Core Java2 Volume I – Fundamentals, Addison Wesley, 1999.			
Reference Books	1. Head First Java, O' Rielly Publications. 2. Y.Daniel Liang, Introduction to Java Programming, 7thEdition, Pearson Education India, 2010.			
Website Link	https://javabeginnerstutorial.com/core-java-tutorial http://docs.oracle.com/javase/tutorial/ https://www.coursera.org/			
Self-Study Material	https://spring.io/projects/spring-boot			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M4UCAC04	**PROGRAMMING IN JAVA**	**DSC THEORY - IV**	**IV**	**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	M	S	M	L	M	M
CO2	M	S	S	M	M	S	L	M	L	M
CO3	S	M	S	M	S	L	L	M	M	M
CO4	M	S	M	M	S	M	M	M	M	M
CO5	S	M	S	S	S	L	M	M	M	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
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MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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RASIPURAM - 637408.

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCAP04	**PROGRAMMING IN JAVA**	**DSC PRACTICAL - IV**	**IV**	**5**	**-**	**-**	**5**	**3**
Objective	To develop simple object-oriented Java programs and enable the students to know about Event handling, String concepts and also to create GUI using AWT.							

S.No.	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer.	K1	5
2	Write a Java program to multiply two given matrices.	K1	5
3	Write a Java program that displays the number of characters, lines and words in a text.	K1	5
4	Write a program to do String Manipulation using Character Array and perform the following string operations: a. String length. b. Finding a character at a particular position. c. Concatenating two strings.	K2	5
5	Write a program to perform string operations using String Buffer class: a. Length of a string b. Reverse a string c. Delete a substring from the given string	K2	5
6	Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.	K3	6
7	Write a program to demonstrate the use of following exceptions. a. Arithmetic Exception b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception	K3	6

8	Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.	K4	6
9	Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).	K4	6
10	Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.	K5	6
11	Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with — stop ‖ or — ready ‖ or — go ‖ should appear above the buttons in a selected color. Initially there is no message shown.	K5	6
Course Outcome	**CO1:** Recall the OOPs Concepts to write the core Java Programs.	K1	
	CO2: Understand the Concepts of inheritance, packages, interfaces and exception handling of core java.	K2	
	CO3: Apply the working of multithreading and I/O streams of java.	K3	
	CO4: Analyze an Applet with AWT Components.	K4	
	CO5: Implement Swing functions to create GUI.	K5	

Learning Resources	
Text Books	1. Herbert Schildt, The Complete Reference Java 2, Tata McGraw Hill, New Delhi, 7th Edition, 2010. 2. Gary Cornell, Core Java2 Volume I – Fundamentals, Addison Wesley, 1999.
Reference Books	1. Head First Java, O'Rielly Publications, 2. Y.Daniel Liang, Introduction to Java Programming, 7thEdition, Pearson Education India, 2010.
Website Link	1. https://javabeginnerstutorial.com/core-java-tutorial 2. http://docs.oracle.com/javase/tutorial/ 3. https://www.coursera.org/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCAP04	**PROGRAMMING IN JAVA**	**DSC PRACTICAL - IV**	**IV**	**5**	**-**	**-**	**5**	**3**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	L	S	M
CO2	S	S	M	M	M	S	M	L	S	L
CO3	M	M	M	S	S	S	M	L	S	M
CO4	M	M	M	S	S	S	M	L	S	M
CO5	M	M	S	S	S	S	M	L	S	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Sample programs to the related topics
Teaching and Learning Methods	Handling practical session through Projector
Assessment Methods	Attendance, Observation, Model practical

Designed By	Verified By	Approved By
Mrs.N.Padmapriya	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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RASIPURAM - 637408.

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAC05	**RDBMS**	**DSC THEORY - V**	**V**	**5**	**5**	-	-	**5**
Objective	Student Learn the high productivity to programmers as it can query, transform, and update data and debugging in a database.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to DBMS**– Data and Information - Database – Database Management System–Objectives-Advantages– Components Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree– Classification–ER diagram to Tables–ISA relationship– Constraints–Aggregation and Composition–Advantages.	K1	12
II	**Relational Model**: CODD's Rule-Relational Data Model-Key- Integrity–Relational Algebra Operations–Advantages and limitations–Relational Calculus– Domain Relational Calculus - QBE.	K2	12
III	**Structure of Relational Database**. Introduction to Relational Database Design-Objectives–Tools–Redundancy and Data Anomaly– Functional Dependency-Normalization–1NF–2NF–3NF–BCNF. Transaction Processing–Database Security.	K3	12
IV	**SQL:** Commands–Data types–DDL-Selection, Projection, Join and Set Operations–Aggregate Functions–DML–Modification-Truncation-Constraints– Sub query.	K4	12
V	**PL/SQL**: Structure-Elements–Operators Precedence–Control Structure– Iterative Control-Cursors-Procedure-Function- Packages–Exceptional Handling-Triggers. **Current Trends-*. Tight Integration with SQL***	K5	12
	…… Self Study.		
Course Outcome	CO1:Remember basic concepts of data base system.	**K1**	
	CO2: Understand a Data model and Schemas in RDBMS.	**K2**	
	CO3: Design use of SQL.	**K3**	

	CO4: Analyze functional dependencies for designing robust Database.	**K4**	
	CO5: create basic concepts of database system.	**K5**	

Learning Resources				
Text Books	1. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016.			
Reference Books	1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan "Database System Concepts" McGraw Hill International Publication, VI Edition. 2. ShioKumar Singh -Database Systems, Pearson publications, II Edition.			
Website Link	https://docs.oracle.com/cd/B13789_01/appdev.101/b10807/01_oview.htm			
Self-Study Material	https://www.javatpoint.com/pl-sql-interview-questions			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAC05	**RDBMS**			**DSC THEORY - V**		**V**	**5**	**5**	-	-	**5**

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Sample Programs to the related topics
Teaching and Learning Methods	Handling Practical Session Through Projector
Assessment Methods	Observation, Model Practical's

Designed By	**Verified By**	**Approved By**
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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAP05	**RDBMS USING SQL**	**DSC PRACTICAL - V**	**V**	**4**	**-**	**-**	**4**	**2**
Objective	Student can develop the database concepts and demonstrate the use of constraints, construct queries using SQL.							

S.No.	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Implement the program using DDL Commands	K1	5
2	Construct a code using DML Commands	K2	5
3	Write the code for TCL Commands	K1	5
4	Design a program for Fibonacci Series	K2	5
5	Develop the code for Factorial	K3	5
6	Write the code for String Reverse	K4	5
7	Implement the program Sum of Series	K4	6
8	Construct a code using Trigger	K3	6
9	Design a program for Student mark analysis using cursor	K5	6

Course Outcome	**CO1:** Recall the various basic concepts of Data Base System .	K1
	CO2: Illustrate the basic concepts of Relational Data Model.	K2
	CO3: Apply and construct data base using Structured Query Language.	K3
	CO4: Analyze operations and enhance.	K4
	CO5: Create to design Database operations and implement using PL/SQL programs.	K5

Learning Resources				
Text Books	1. Coronel,Morris,Rob,"Database Systems Design, Implementation and Management", Ninth Edition 2 .NileshShah,"DatabaseSystemsUsingOracle",2ndedition,PearsonEducationIndia, 2016			
Reference Books	1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan,—Database System Concepts‖,McGrawHillInternationalPublication,VIEdition 2. ShioKumarSingh,—DatabaseSystems—,Pearsonpublications,IIEdition			
Website Link	https://www.youtube.com/watch?v=J4PQ5fdn3Ns			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAP05	**RDBMS USING SQL**	**DSC PRACTICAL - V**	**V**	**4**	**-**	**-**	**4**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Sample programs to related topics
Teaching and Learning Methods	Handling practical session through projector
Assessment Methods	Attendance, Observation, Model practical's.

Designed By	Verified By	Approved By
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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAC06	**ASP.NET PROGRAMMING**	**DSC THEORY - VI**	**V**	**5**	**5**	**-**	**-**	**5**
Objective	Students Learn the .NET frame work and with C# language and ASP. NET Web application using standard controls.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Overview of.NET framework:** Common Language Runtime (CLR), Framework Class Library. **C# Fundamentals:** Primitive types and Variables – Operators - conditional statements - Looping statements – Creating and using Objects – Arrays – String operations.	K1	12
II	**Introduction to ASP.NET** - IDE Languages supported Components-Working with Web Forms - **Web form standard controls:** Properties and its events – HTML controls -**List Controls:** Properties and its events.	K2	12
III	**Rich Controls:** Properties and its events – validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files – File uploading.	K3	12
IV	**ADO.NET Overview** – Database Connections–Commands –Data Reader - Data Adapter - Data Sets - Data Controls and its properties – Data Binding.	K4	12
V	**Grid View control:** Deleting, editing, Sorting and Paging.XML classes–Web form to manipulate XML files Website Security – Authentication – Authorization – Creating a Web application. **Current trends-*Azure cloud development-Net core-Microsoft BLazor.***	K5	12
	…… Self Study.		
	CO1: Define the working knowledge of C# programming constructs and the. NET Framework.	K1	
	CO2: Illustrate a software to solve real world problems using ASP.NET.	K2	

Course Outcome	**CO3:** Apply the Various File modes to Access the Files.	K3	
	CO4: Examine the web application and Database Connection using Microsoft ADO.NET.	K4	
	CO5: Estimate the web applications using XML.	K5	

Learning Resources				
Text Books	1. Svetlin Nakov, Veselin Kolev &Co, "Fundamentals of Computer Programming with C#", Faber publication,2019. 2. Mathew , MacDonald , "The Complete Reference ASP.NET" , Tata McGraw-Hill,2015.			
Reference Books	1 Herbert Schildt , The Complete Reference C# .NET, Tata McGraw-Hill,2017. 2. Kogent Learning Solutions, C# 2012Programming Covers .NET 4.5 Black Book, Dreamtechpres,2013. 3. Denielle Otey , Michael Otey,ADO.NET:The Complete reference,McGrawHill,2008. 4. Matthew Mac Donald , Beginning ASP.NET4 in C# 2010,A PRESS,2010.			
Website Link	https://www.geeksforgeeks.org/introduction-to-net-framework/			
Self-Study Material	1. https://www.arkasoftwares.com/blog/net-development-trends/ 2. https://www.javatpoint.com/net-framework			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Title	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAC06	**ASP.NET PROGRAMMING**			**DSC THEORY - VI**		**V**	**5**	**5**	**-**	**-**	**5**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAP06	**ASP. NET PROGRAMMING**	**DSC PRACTICAL - VI**	**V**	**4**	**-**	**-**	**4**	**2**

Objective	Students develop ASP.NET Web application using standard controls and create rich database applications using ADO.NET.

S.No	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Develop an exposure of Web applications and tools.	K1	3
2	Implement the Html Controls.	K1	3
3	Implement the Server Controls.	K1	3
4	Develop Web application using Web controls.	K2	3
5	Develop Web application using List controls.	K2	3
6	Web Page design using Rich control. Validate User input using Validation controls. Working with File concepts.	K3	3
7	Web application using Data Controls.	K3	3
8	Data binding with Web controls.	K4	3
9	Data binding with Data Controls.	K4	3
10	Data base application to perform insert, update and delete operations.	K3	3
11	Database application using Data Controls to perform insert, delete, edit, paging and sorting operation.	K4	3
12	Implement the Xml classes.	K5	3
13	Implement Authentication – Authorization.	K5	4
14	Ticket reservation using ASP.NET controls.	K5	4
15	Online examination using ASP.NET controls.	K5	4
Course Outcome	**CO1:** Define the web applications and implement various controls.	K1	
	CO2: Interpret a web page in Rich control.	K2	
	CO3: Organize about file handling operations.	K3	
	CO4: Inspect the design using XML classes.	K4	
	CO5: Evaluate the software to solve real world problems using ASP.NET.	K5	

Learning Resources				
Text Books	Svetl in Nakov , Veselin Kolev & Co, Fundamentals of Computer Programming with C# , Faber publication , 2019.			
Reference Books	Herbert Schildt, The Complete Reference C#. NET, Tata Mc Graw-Hill, 2017.			
Website Link	1. https://www.geeksforgeeks.org/introduction-to-net-framework/ 2. https://www.javatpoint.com/net-framework			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Title	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAP06	**ASP. NET PROGRAMMING**		**DSC PRACTICAL - VI**		**V**	**4**	**-**	**-**	**4**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	L	L	M	S	S
CO2	M	S	L	M	S	S	M	S	S	S
CO3	S	L	S	S	M	S	S	M	M	S
CO4	M	S	S	S	S	M	M	S	S	S
CO5	M	S	M	M	M	S	M	S	M	S
	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Sample programs to related topics
Teaching and Learning Methods	Handling practical session through projector
Assessment Methods	Attendance, Observation, Model practical's

Designed By	Verified By	Approved By
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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCAC07	**COMPUTER NETWORKS**	**DSC THEORY-VII**	**VI**	**5**	**5**	**-**	**-**	**5**

Objective	Students Learn Data communication, Computer network and impart knowledge about networking and inter networking devices.

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example. **Networks:** Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media.	K1	12
II	**Wireless Transmission** - Communication Satellites – **Telephone System:** Structure, Local Loop, Trunks and Multiplexing and Switching**. Data Link Layer:** Design Issues - Error Detection and Correction.	K2	12
III	**Elementary Data Link Protocols** - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols–Bluetooth.	K3	12
IV	**Network Layer** - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	K3	12
V	**Transport Layer** – Services - Connection Management-Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP)-**Network Security:** Cryptography.	K4	12
	Current Trends-*Networking Trends *		
	…… Self Study.		
Course Outcome	**CO1:** Recall the basics Computer Network architecture, OSI and TCP/IP reference model.	K1	
	CO2: Illustrate on Telephone systems using Wireless network.	K2	
	CO3: Utilize the concept of Sliding Window Protocols.	K3	
	CO4: Analyze the characteristics of Routing and Congestion control algorithms.	K3	
	CO5: Examine the various Protocols such as FTP, HTTP, Telnet, DNS and Cryptography.	K4	

Learning Resources				
Text Books	A.S.Tanenbaum — Computer Networks, 4th Edition, Prentice – Hall of India, 2008.			
Reference Books	1. B.A.Forouzan— Data Communications and Networking, Tata McGraw Hill,4th Edition,2017 2. F. Halsall — Data Communications, Computer Networks and Open Systems, Pearson Education, 2008.			
Website Link	https://en.wikipedia.org/wiki/Computer_network			
Self-Study Material	https://www.enterprisenetworkingplanet.com/management/top-networking-trends/			
	L-Lecture	**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M6UCAC07	**COMPUTER NETWORKS**	**DSC THEORY-VII**	**VI**	**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.P.Mohankumar	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
RASIPURAM - 637408.

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCAC08	**DATA ANALYTICS USING R PROGRAMMING**	**DSC THEORY - VIII**	**VI**	**5**	**5**	**-**	**-**	**5**
Objective	Students Learn the basics of R programming and data structures like lists, tuples, and dictionaries, as well as input/output operations with files in R Programming.							

Unit	Course Content	Knowledge Levels	Sessions
I	**EVOLUTION OF BIG DATA:** Best Practices for Big data Analytics — Big data characteristics — Validating —The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value - Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — Map Reduce and YARN —Map Reduce Programming Model.	K1	12
II	**CONTROL STRUCTURES AND VECTORS:** Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common - Vector Operations.	K2	12
III	**LISTS:** Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations.	K3	12
IV	**FACTORS AND TABLES:** Factors and Levels, Common Functions Used with Factors, Working With Tables, Matrix / Array Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in A Table, Math Functions, Calculating a Probability, Cumulative Sums	K4	12

	and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions RPROGRAMMING.		
V	**OBJECT- ORIENTED PROGRAMMINGS:** Classes, SGeneric Functions, Writing SClasses, Using Inheritance, SClasses, Writing SClasses, Implementing a Generic Function on an SClass, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation. **Current Trends -* Data Fabric. ***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Recall the fundamental ideas behind big data tools and their analysis techniques.	**K1**	
	CO2: Employ data through the application of clustering and classification algorithms.	**K2**	
	CO3: Sketch various mining algorithms for handling large volumes of data, and imparting knowledge on techniques.	**K3**	
	CO4: Assess advanced analytics on real-time data streams, and make informed decisions.	**K4**	
	CO5: Develop SQL databases by employing advanced design strategies to ensure efficient data retrieval, and maintenance.	**K5**	

Learning Resources	
Text Books	1.Roge D.Peng, "R Programming for DataScience",2012. 2.Norman Matloff, "The Art of R Programming - A Tour of Statistical Software Design", 2011.
Reference Books	1. Garrett Grolemund, Hadley Wickham, "Hands On Programming with R: Write Your Own Functions and Simulations", 1st Edition, 2014. 2. Venables, W.N., and Ripley, "R programming", Springer, 2000.
Website Link	1. https://www.simplilearn.com
Self-Study Material	1.https://www.starburst.io/data-glossary/data-fabric/ 2.ttps://ebookcentral.proquest.com/lib/inflibnet-ebooks/reader.action?docID=29449175&query=data+fabric+in+DATA+ANALYTICS+USING+R+PROGRAMMING

	L-Lecture	**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M6UCAC08	**DATA ANALYTICS USING R PROGRAMMING**	**DSC THEORY - VIII**	**VI**	**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.V.Krishnaveni	**HOD – Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCAP07	**R PROGRAMMING**	**DSC PRACTICAL - VII**	**VI**	**6**	**-**	**-**	**6**	**3**
Objective	Students learn the basic programming constructs in R Programming, and apply diverse computational strategies to tackle real-world challenges in R-based solutions.							

S.No.	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending Upon user's choice.	K1	6
2	Program to find the area of rectangle, square, circle and triangle by accepting suitable input Parameters from the user.	K1	6
3	Construct a program to find a list of even numbers from 1 to n using R-Loops.	K1	6
4	Create a function to print squares of numbers in sequence.	K2	6
5	Develop a program to join columns and rows in a data Frame using cbind() and rbind() in R.	K2	6
6	Implement different String Manipulation functions in R.	K3	6
7	Implement different data structures in R (Vectors, Lists, DataFrames)	K3	6
8	Develop a program to read a csv file and analyze the data in the file in R.	K4	6
9	Create pie chart and bar chart using R.	K4	6
10	Create a data set and do statistical analysis on the data using R.	K3	6
11	Program to find factorial of the given number using recursive function.	K4	6
12	Construct a R program to count the number of even and odd numbers from array of N numbers	K5	6
Course Outcome	**CO1:** Understand programming skills in core R Programming.	K1	
	CO2: Sketch simple representation of the Object-oriented programming concept.	K2	
	CO3: Dramatize appropriate skills for crafting Graphical-User Interfaces in R Programming.	K3	

	CO4: Analyze R Programming skills tailored to transition into specialized branches.		K4	
	CO5: Create GUI application for updating databases, demonstrating proficiency in database management.		K5	
Learning Resources				
Text Books	1.Roge D.Peng, "R Programming for DataScience",2012. 2.Norman Matloff, "The Art of R Programming - A Tour of Statistical Software Design", 2011.			
Reference Books	1. Garrett Grolemund, Hadley Wickham, "Hands On Programming with R: Write Your Own Functions and Simulations", 1st Edition, 2014. 2. Venables, W.N., and Ripley, "R programming", Springer, 2000.			
Website Link	1. https://www.simplilearn.com			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M6UCAP07	**R PROGRAMMING**	**DSC PRACTICAL - VII**	**VI**	**6**	**-**	**-**	**6**	**3**	

CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	M	S	S	L	L	M	S	S
CO2	M	S	L	M	S	S	M	S	S	S
CO3	S	L	S	S	M	S	S	M	M	S
CO4	M	S	S	S	S	M	M	S	S	S
CO5	M	S	M	M	M	S	M	S	M	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Sample programs to related topic
Teaching and Learning Methods	Handling practical session through projector
Assessment Methods	Observation, Model practical's

Designed By	**Verified By**	**Approved By**
Mrs.V.Krishnaveni	**HoD – Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

List of Foundation Course (FC) offered by the B.C.A.,
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S.No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	I	23M1UCAFC1	STRUCTURED PROGRAMMING IN C

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCAFC1	**STRUCTURED PROGRAMMING IN C**	**FC - I**	**I**	**2**	**2**	**-**	**-**	**2**
Objective	Students learn the Programming basics and the fundamentals of C, Data types Mathematical, logical operations with Decision Making Statements.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Overview of C:** Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables-Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.	K1	6
II	**Decision Making and Branching:** Decision making with If, simple IF, IF ELSE, nested IF ELSE, ELSE IF ladder, switch, GOTO statement. Decision Making and Looping: While, Do While, For, Jumps in loop.	K2	6
III	**Arrays:** Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.	K3	6
IV	**Functions:** The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions.	K4	6
V	**Pointers:** definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and Structure.	K4	6

Course Outcome	**CO1:** Recall the program structure of C with its syntax and semantics.			**K1**	
	CO2: Illustrate the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files).			**K2**	
	CO3: Apply the programming principles learnt in real-time problems.			**K3**	
	CO4: Categorize the various methods of solving a problem and choose the best method.			**K3**	
	CO5: Assess the Code, debug and test the programs with appropriate test cases.			**K4**	
Learning Resources					
Text Books	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.				
Reference Books	1. Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018. 2. Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998. 3. YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021.				
Website Link	1. https://www.geeksforgeeks.org/c-programming-language/ 2. http://learn-c.org/ 3. https://www.cprogramming.com				
	L-Lecture	**T-Tutorial**	**P-Practical**	**C-credit**	

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCAFC1	**STRUCTURED PROGRAMMING IN C**			**FC - I**	**I**	**2**	**2**	**-**	**-**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	M	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG
Tutorial Schedule	Group Discussion, Quiz program, Model preparation		
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation		
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE		

Designed By	**Verified By**	**Approved By**
Mrs.N.Padmavathi **Mr.K.Vijayakumar**	**HoD – Dr.V.Vijayadeepa**	**Member Secretary – Dr.S.Shahitha**

List of Elective Course (DSE) Details for B.C.A., SYLLABUS - LOCF-CBCS Pattern EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards			
S.No.	**SEM**	**COURSE_CODE**	**TITLE OF THE COURSE**
1		23M_UCAE01	Software Metrics
2		23M_UCAE02	Natural Language Processing
3		23M_UCAE03	Analytics for Service Industry
4		23M_UCAE04	Cryptography
5		23M_UCAE05	Database Management System
6		23M_UCAE06	Big Data Analytics
7		23M_UCAE07	IOT and its Applications
8		23M_UCAE08	Software Project Management
9		23M_UCAE09	Image Processing
10		23M_UCAE10	Information Security
11		23M_UCAE11	Human Computer Interaction
12		23M_UCAE12	Fuzzy Logic
13		23M_UCAE13	Artificial Intelligence
14		23M_UCAE14	Mobile Ad-hoc Network
15		23M_UCAE15	Computational Intelligence18
16		23M_UCAE16	Grid Computing
17		23M_UCAE17	Cloud Computing
18		23M_UCAE18	Artificial Neural Network
19		23M_UCAE19	Agile Project Management
20		23M_UCAC_	Microprocessor and Microcontroller
21		23M_UCAP_	Microprocessor and Microcontroller
22		23M_UCAC_	Software Engineering
23		23M_UCAC_	Machine Learning Techniques
24		23M_UCAP_	Machine Learning
25		23M_UCAC_	Network Security
26		23M_UCAC_	Data Mining and Warehousing
27		23M_UCAC_	Mobile Application Development
28		23M_UCAP_	Mobile Application Development
29		23M_UCAC_	Introduction to Data Science

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE01	**SOFTWARE METRICS**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Student Learn the quality of the current product or process, improve that quality and predict the quality once the software development project is complete.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Fundamentals of Measurement:** Need for Measurement: Measurement in Software Engineering, Scope of Software Metrics, **The Basics of measurement**: The representational theory of measurement, Measurement and models, Measurement scales and scale types, meaningfulness in measurement.	K1	12
II	**A Goal-Based Framework For Software Measurement:** Classifying software measures, Determining what to measure, Applying the framework, Software measurement validation, Performing Software Measurement Validation. **Empirical investigation**: Principles of Empirical Studies, Planning Experiments, Planning case studies as quasi experiments, Relevant and Meaningful Studies.	K2	12
III	**Software Metrics Data Collection:** Defining good data, Data collection for incident reports, How to collect data, Reliability of data collection Procedures. **Analyzing software measurement data:** Statistical distributions and hypothesis testing, Classical data analysis techniques, Examples of simple analysis techniques.	K3	11
	Measuring internal product attributes: Size Properties of Software Size, Code size, Design size, Requirements analysis and Specification size, Functional size measures and estimators, Applications of size measures. **Measuring internal product attributes: Structure:** Aspects of Structural Measures, Control flow structure of program units, Design level Attributes, Object-oriented Structural attributes and measures.	K4	12
V	**Measuring External Product Attributes:** Modelling software quality, Measuring aspects of quality, Usability Measures, Maintainability measures, Security Measures.	K5	13

	Software Reliability: Measurement and Prediction: Basics of reliability theory, The software reliability problem, Parametric reliability growth models, Predictive accuracy **Current Trends**: Customer experience using Net Promoter Score, Team satisfaction using a team health check.		
	…… Self Study.		
Course Outcome	**CO1:** Recalling various fundamentals of measurement and software metrics.	K1	
	CO2: Identify framework and classifying analysis techniques for software measurement.	K2	
	CO3: Implementing internal and external attributes of software product for effort estimation.	K3	
	CO4: Analyze different techniques to interpret software metrics data and derive Meaningful insights.	K4	
	CO5: Recommend reliability models for predicting software quality.	K5	

Learning Resources				
Text Books	1. Norman Fenton, James Bieman, Software Metrics A Rigorous and Practical Approach Third Edition, 2014.			
Reference Books	1. Stephen H.Kan, Metric and models in software quality engineering, Second edition, 2002, Addison Wesley Professional. 2. Robert B.Grady, Practical Software Metrics for Project Management and Process Improvement, 1992, Prentice Hall.			
Website Link	https://lansa.com/blog/general/what-are-software-metrics-how-can-i-measure-thesemetrics/ 1. https://stackify.com/track-software-metrics/			
Self-Study Material	https://www.apptio.com/blog/software-development-metrics/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE01	**SOFTWARE METRICS**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO - PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	S	S	S	S	S	M	S	S	S
CO2	S	M	M	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	S
CO4	S	S	S	M	S	M	S	S	S	S
CO5	M	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE02	**NATURAL LANGUAGE PROCESSING**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students Learn the semantics in NLP, applying basic algorithms and comprehending statistical approaches to machine translation.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics – Information theory – Collocations -N-gram Language Models – Estimating parameters and smoothing – Evaluating language models.	K1	12
II	**Word level and Syntactic Analysis:** Word Level Analysis: Regular Expressions-Finite-State Automata - Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. **Syntactic Analysis:** Context-free Grammar-Constituency Parsing-Probabilistic Parsing.	K2	12
III	**Semantic analysis and Discourse Processing:** Semantic Analysis: Meaning Representation-Lexical Semantics-Ambiguity-Word Sense Disambiguation. **Discourse Processing:** cohesion-Reference Resolution Discourse Coherence and Structure.	K3	12
IV	**Natural Language Generation:** Architecture of NLG Systems Generation Tasks and Representations- Application of NLG. **Machine Translation:** Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.	K4	12
V	**Information retrieval and lexical resources:** Information Retrieval: Design features of Information Retrieval Systems-Classical, Non classical and Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net Stemmers- POS Tagger- Research Corpora SSAS. **Current Trends- * Language Transformers***	K4	12
	…… Self Study.		
	CO1: Recall the principles and methodologies of natural language processing.	K1	

Course Outcome	**CO2**: Illustrate the Error Correction and Detection and Syntactic Analysis.	K2
	CO3: Build NLP methods to assess sentiment within a textual document.	K3
	CO4: Examine extensive text datasets derived from various real-world applications.	K4
	CO5: Assume the framework for the integration of artificial intelligence and surrounding environments.	K4

Learning Resources				
Text Books	1. Daniel Jurafsky, James H. Martin, Speech & language processing, Pearson publications. 2. Allen, James.,Natural language understanding. Pearson, 1995.			
Reference Books	1. Pierre M. Nugues, An Introduction to Language Processing with Perl and Prolog, Springer.			
Website Link	1. https://en.wikipedia.org/wiki/Natural_language_processing 2. https://www.techtarget.com/searchenterpriseai/definition/natural-languageprocessing			
Self-Study Material	https://www.startus-insights.com/innovators-guide/natural-language-processing-trends/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE02	**NATURAL LANGUAGE PROCESSING**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO - PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.P.Mohankumar	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
RASIPURAM - 637408.

B.C.A Syllabus LOCF-CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
23M_UCAE03	ANALYTICS FOR SERVICE INDUSTRY	DSE THEORY		5	3	2	-	4

Objective	Student Learn the concepts and methodologies of business analytics, progressing to analyze and create solutions for decision problems across various contexts.

Unit	Course Content	Knowledge Levels	Sessions
I	**Healthcare Analytics** : Introduction to Healthcare Data Analytics Electronic Health Records– Components of EHR- Coding Systems Benefits of EHR- Barrier to Adopting HER Challenges Pheno typing Algorithms. Biomedical Image Analysis and Signal Analysis-GenomicDataAnalysisforPersonalizedMedicine.ReviewofClinicalPredict ion Models.	K1	12
II	**Healthcare Analytics Applications :** Applications and Practical Systems for Healthcare– Data Analytics for Pervasive Health- Fraud Detection in Healthcare-Data Analytics for Pharmaceutical Discoveries Clinical Decision Support Systems-Computer Assisted Medical Image Analysis Systems-Mobile Imaging and Analytics for Biomedical Data.	K2	12
III	**HR Analytics:** Evolution of HR Analytics, HR information systems and data sources, HR Metric and HR Analytics, Evolution of HR Analytics;HRMetricsandHRAnalytics;Intuitionversusanalyticalthinking; HRMS/HRIS and data sources ;Analytics frameworks like LAMP, HCM:21(r)Model.	K3	12
IV	**Performance Analysis:** Predicting employee performance, Training requirements, evaluating training and development, Optimizing selection and promotion decisions.	K4	12
V	**Tourism and Hospitality Analytics:** Guest Customer Satisfaction– Dynamic Pricing–optimized disruption management–Fraud detection in payments. Analytics Loyalty Analytic. ***Current Trends - Predictive Analytics *.**	K5	12
	…… Self Study.		
Course Outcome	**CO1: R**ecall the concepts and methods of business analytics	K1	
	CO2: Predict the model and solve decision problems in different settings.	K2	
	CO3: Apply solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity.	K3	
	CO4: Analyze the solutions to decision making problems.	K4	

	CO5: Create a sense of ethical decision-making and a commitment to the long-run welfare of both organizations and the communities they serve..		K5	
Learning Resources				
Text Books	1 ChandanK.Reddy and CharuCAggarwal,—Healthcare data analytics‖, Taylor & Francis, 2015. 2 Edwards Martin R,Edwards Kirsten ,—Predictive HR Analytics: Mastering the HR Metric‖, Kogan Page Publishers 2016, ISBN-0749473924 3 Fitz-enzJac,—The new HR analytics: predicting the economic value of your company's human capital investments 2010 ‖,AMACOM,ISBN-13:978-0-8144-1643-3 4 Rajendra Sahu, Manoj Dash and Anil Kumar. Applying Predictive Analytics Within the Service Sector.			
Reference Books	1. HuiYang and EvaK. Lee,—Healthcare Analytics: From Data to Knowledge to Health care Improvement, Wiley, 2016 2. Fitz-enzJac, Mattox II John,—Predictive Analytics for Human Resources‖, Wiley 2014, ISBN-1118940709.			
Website Link	1. https://www.ukessays.com/essays/marketing/contemporary-issues-in-marketing-marketing-essay.php 2. https://yourbusiness.azcentral.com/examples-contemporary-issues-marketing-field-26524.html			
Self-Study Material	1.https://www.datapine.com/blog/business-intelligence-trends/ 2. https://ebookcentral.proquest.com/lib/inflibnet-ebooks/reader.action?docID=4334745			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE03	**ANALYTICS FOR SERVICE INDUSTRY**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	M	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mrs.K.Gayathri	**HOD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE04	**CRYPTOGRAPHY**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students Learn the fundamentals of Cryptography and to acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** The OSI security Architecture – Security Attacks - Security Mechanisms - Security Services - A model for network Security.	K1	12
II	**Classical Encryption Techniques:** Symmetric Cipher model – Substitution Techniques: Caesar Cipher – Mono alphabetic cipher–Play fair cipher – Poly Alphabetic Cipher– Transposition techniques–Stenography.	K2	12
III	**Block Cipher and DES:** Block Cipher Principles–DES–The Strength of DES–**RSA:** The RSA algorithm.	K2	12
IV	**Network Security Practices**: IP Security overview-IP Security architecture–Authentication Header. **Web Security**: Secure Socket Layer And Transport Layer Security–Secure Electronic Transaction.	K3	12
V	**Intruders** – Intrusion detection – Password Management- **Malicious software:** Viruses and Related Threats – Virus Counter measures – Distributed Denial of Service Attacks – **Firewalls:** Firewall Design Principles – Trusted systems – Common Criteria for Information Technology Security Evaluation. ***Current Trends: Homomorphic encryption – Cryptogrpahy in Blockchain ***	K4	12

	Self-Study		
Course Outcome	**CO1:** Recall the Computer Networking Process.	K1	
	CO2: Interpret the different cryptographic operations of symmetric cryptographic algorithms.	K2	
	CO3: Demonstrate Block Cipher Principles.	K2	
	CO4: Develop the various Authentication Schemes to simulate different applications.	K3	
	CO5: Assume the various Security practices and Firewall Design Principles.	K4	

Learning Resources				
Text Books	1. William Stallings, —Cryptography and Network Security Principles and Practices.			
Reference Books	1. Behrouz A.Foruzan - Cryptography and Network Security, Tata Mc Graw-Hill, 2007. 2. AtulKahate - Cryptography and Network Security, Second Edition, 2003, TMH. 3. M.V.ArunKumar - Network Security, 2011, First Edition, USP.			
Website Link	1. https://www.tutorialspoint.com/cryptography/ 2. https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography			
Self-Study Material	1. https://www.linkedin.com/advice/0/what-current-emerging-trends-innovations-1e 2. https://www.geeksforgeeks.org/cryptography-in-blockchain/			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE04	**CRYPTOGRAPHY**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	M	S	M	S
CO3	S	M	S	S	S	M	S	M	M	M
CO4	S	S	M	S	S	M	S	S	M	M
CO5	S	S	M	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mr.T.Prabhu	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE05	**DATABASE MANAGEMENT SYSTEM**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students learn the designing of database systems, foundation on the relational model of data and normal forms and writing queries using SQL and PL/SQL.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Database Concepts**: Database Systems Data VS Information - introducing the database - File system -Problems with file system – Database systems. Data models: Importance-Basic Building Blocks Business rules - Evolution of Data models - Degree Of Data Abstraction.	K1	10
II	**Design Concepts**: Relational database model - Logical view of data- keys-Integrity rules relational set operators - data dictionary and the system catalog-relationships-data redundancy revisited-indexes codd's rules. Entity relationship model - ER diagram.	K2	11
III	**Normalization of Database Tables**: Database Tables and Normalization -The Need for Normalization -The Normalization Process - Higher level Normal Form. Introduction to SQL: Data Definition Commands - Data Manipulation Commands–SELECT Queries - Additional Data Definition Commands - Additional SELECT Query Keywords - Joining Database Tables.	K2	12
IV	**Advanced SQL**: Relational SET Operators: UNION –UNION ALL– INTERSECT-MINUS.SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN –HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function–Numeric Function–String Function–Conversion Function.	K3	12
V	**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: Nested Blocks - SQL in PL/SQL - Data Manipulation-Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes–Cursor For loops – SELECT…FOR UPDATE- WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions. **Current Trends : * Recent Trend in SDLC *.**	K3	15
	…… Self Study.		

Course Outcome	**CO1:** Remember the various basic concepts of Database System and compare various data models.				K1
	CO2: Understand the integrity constraints and the Basic concepts of Relational Data Model & Entity Relationship Model.				K2
	CO3: Analyse normalization techniques within the database and construct queries using SQL.				K3
	CO4: Apply the different functions and various join operations and enhance the knowledge of handling Multiple tables.				K3
	CO5: Evaluate Database operations and implement it using PL/SQL programs.				K4
Learning Resources					
Text Books	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016.				
Reference Books	1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan "Database System Concepts" McGraw Hill International Publication, VI Edition. 2. ShioKumar Singh -Database Systems, Pearson publications, II Edition.				
Website Link	Web resources from NDL Library, E-content from open-source libraries				
Self-Study Material	https://www.youtube.com/watch?v=J4PQ5fdn3Ns				
	L-Lecture	T-Tutorial	P-Practical	C-Credit	

BCA - Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE05	**DATABASE MANAGEMENT SYSTEM**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	S	S	M	M	S	M	S	S	S
CO2	S	S	S	S	M	S	S	S	M	S
CO3	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mr.M.Ravi	**HOD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE06	**BIG DATA ANALYTICS**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students Learn the Big Data Platform and its Use cases, Map Reduce Jobs, basics of cluster and decision tree, Association Rules, Recommendation System, No SQL Databases.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Evolution of Big data** - Best Practices for Big data Analytics - Big data characteristics - Validating - The Promotion of the Value of Big Data - Big Data Use Cases - Characteristics of Big Data Applications -Perception and Quantification of Value – Understanding Big Data Storage - A General Overview of High – Performance Architecture - HDFS - Map Reduce and YARN – Map Reduce Programming Model.	K1	9
II	**Advanced Analytical Theory and Methods:** Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions **Classification:** Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naive Bayes - Bayes Theorem – NaiveBayes Classifier.	K2	9
III	**Advanced Analytical Theory and Methods:** Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules-Applications of Association Rules - Finding Association & finding Similarity**.** **Recommendation System:** Collaborative Recommendation - Content Based Recommendation – Knowledge Based Recommendation - Hybrid Recommendation Approaches.	K3	10
IV	**Introduction to Streams Concepts** - Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream - Filtering Streams - Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window-Real Time Analytics Platform(RTAP) applications - Case Studies – Real Time Sentiment Analysis, Stock Market Predictions. **Using Graph Analytics for Big Data:** Graph Analytics	K4	10

V	**NoSQL Databases :** Schema - less Models – Increasing Flexibility for Data Manipulation - Key Value Stores - Document Stores -Tabular Stores - Object Data Stores – Graph Databases Hive – Sharding - Hbase - Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R. **Current Trends-* Edge Computing***	K5	10
	…… Self Study.		
Course Outcome	**CO1:** Recall the big data tools and its analysis techniques	K1	
	CO2: Analyze data by utilizing clustering and classification algorithms.	K2	
	CO3: Apply different mining algorithms and recommendation systems for large volumes of data.	K3	
	CO4: Perform analytics on data streams.	K4	
	CO5: Evaluate no SQL databases and management.	K5	

Learning Resources

Text Books	Anand Rajaraman and Jeffrey David Ullman, - Mining of Massive Datasets, Cambridge University Press, 2012.
Reference Books	1. David Loshin - Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph ,Morgan Kaufmann/Elsevier Publishers,2013. 2. EMC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley publishers, 2015.
Website Link	1. https://www.simplilearn.com 2. https://www.sas.com/en_us/insights/analytics/big-data-analytics.html
Self-Study Material	1.https://www.cloudflare.com/learning/serverless/glossary/what-is-edge-computing/ 2. https://en.wikipedia.org/wiki/Edge_computing

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE06	**BIG DATA ANALYTICS**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	L	S	M	M	S
CO2	S	S	M	M	M	S	M	S	M	S
CO3	M	M	M	S	S	L	S	M	M	M
CO4	M	M	M	S	S	S	S	S	L	S
CO5	M	M	S	M	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.A.Raja	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE07	**INTERNET OF THINGS AND ITS APPLICATIONS**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students learn the basic concepts of IoT devices, gateways and Data management, to analyze their performance and to learn about privacy and security issues in IoT.							

Unit	Course Content	Knowledge Levels	Sessions
I	**IoT & WebTechnology:** The Internet of Things Today - Time for Convergence – Towards the IoT Universe - Internet of Things Vision - IoT Strategic Research and Innovation Directions – IoT Applications – Future Internet Technologies - Infrastructure, Networks and Communication – Processes – Data Management – Security - Privacy & Trust - Device Level Energy Issues - IoT Related Standardization - Recommendations on Research Topics.	K1	9
II	**M2M to IoT** – A Basic Perspective – Introduction - Some Definitions - M2M Value Chains - IoT Value Chains - An emerging industrial structure for IoT - The international driven global value chain and global information monopolies. M2M to IoT – An Architectural Overview – Building an architecture - Main design principles and needed capabilities - An IoT architecture Outline - standards considerations.	K2	9
III	**IoT Architecture - State of the Art**: Introduction - State of the art - Architecture. **Reference Model**: Introduction - Reference Model and architecture - IoT reference Model. **IoT Reference Architecture:** Introduction – Functional View – Information View – Deployment and Operational View – Other Relevant architectural views.	K3	10
IV	**IoT Applications for Value Creations:** Introduction - IoT applications for industry: Future Factory Concepts - Brown field IoT - Smart Objects - Smart Applications - Four Aspects in your Business to Master IoT - Value Creation from Big Data and Serialization - IoT for Retailing Industry - IoT For Oil and Gas Industry - Opinions on IoT Application and Value for Industry - Home Management.	K4	10
V	**Internet of Things Privacy, Security and Governance :** Introduction – Overview of Governance – Privacy and Security Issues – Contribution from FP7 Projects – Security - Privacy and Trust in IoT – Data - Platforms for Smart Cities - First Steps Towards a Secure Platform - Smartie Approach. Data Aggregation for the IoT in Smart Cities – Security. ***Current Trends: Smart cities, AI Integration.***	K4	10

	…….. Self Study		
Course Outcome	**CO1:** Recall the use of Devices, Gateways and Data Management in IoT.	K1	
	CO2: Identify IoT applications in different domains and be able to analyze their performance.	K2	
	CO3: Implement basic IoT applications on embedded Platform.	K3	
	CO4: Gain knowledge on Industry internet of Things.	K4	
	CO5: Evaluate the privacy and Security issues in IoT.	K4	

Learning Resources	
Text Books	1.Vijay Madisetti and Arshdeep Bahga,—Internet of Things: (A Hands – on Approach) ‖, Universities Press (INDIA) Private Limited 2014, 1st Edition.
Reference Books	1. Michael Miller – The Internet of Things : How Smart TVs, Smart Cars, Smart Homes, And Smart Cities Are Changing the World ‖, kindle version. 2. Francisda Costa,—Rethinking the Internet of Things: A Scalable Approach to Connecting Everything ‖, A press Publications 2013, 1st Edition. 3. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice ‖ 4. CunoPfister, — Getting Started with the Internet of Things‖, O ‟Reilly Media 2011.
Website Link	https://www.simplilearn.com https://www.javatpoint.com https://www.w3schools.com
Self-Study Material	https://www.antino.com/blog/top-9-iot-trends

	L-Lecture	T-Tutorial	P-Practical	C- Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE07	**INTERNET OF THINGS AND ITS APPLICATIONS**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	M	L	L	M	L
CO2	S	S	M	M	M	M	M	L	L	S
CO3	M	M	S	S	S	S	L	M	L	L
CO4	M	M	M	S	S	M	L	L	M	L
CO5	M	M	M	S	S	M	L	L	M	L

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mrs.N.Padmapriya	**HOD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE08	**SOFTWARE PROJECT MANAGEMENT**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**

Objective	Students Learn the software project management metrics and strategy in effectively managing projects and apply the software testing techniques.

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction of Software Development Process:** Introduction to Competencies - Product Development Techniques Management Skills - Product Development Life Cycle – Software Development Process and models-The SEICMM International Organization for Standardization.	K1	8
II	**Project plan:** Managing Domain Processes - Project Selection Models – Project Portfolio Management- Financial Processes- Selecting a Project Team - Goal and Scope of the Software Project -Project Planning -Creating the Work Breakdown Structure - Approaches to Building a WBS-Project Milestones-Work Packages-Building a WBS for Software.	K2	10
III	Tasks and Activities - Software Size and Reuse Estimating – The SEICMM-Problems and Risks-Cost Estimation. **Effort Measures COCOMO:** A Regression Model. **COCOMOII SLIM:** A Mathematical Model-Organizational Planning-Project Roles and Skills Needed.	K3	10
IV	**Project Management Resource Activities:** Organizational Form and Structure - Software Development Dependencies - Brainstorming -Scheduling Fundamentals – PERT and CPM – Levelling Resource Assignments-Map the Schedule to a Real Calendar- Critical Chain Scheduling.	K4	10
V	**Quality:** Requirements – The SEI CMM - Guidelines - Challenges Quality Function Deployment-Building the Software Quality Assurance – Plan. **Software Configuration Management:** Principles Requirements-Planning and Organizing-Tools-Benefits-Legal Issues in Software-Case Study. **Current Trends- *Block chain in Project Management***	K5	10
	…… Self Study.		

Course Outcome	**CO1:** Recall the basic Principles and Concepts of Project management.	K1	
	CO2: Explain the concept of Software Development Process and models.	K2	
	CO3: Develop the Software project management Methodologies.	K3	
	CO4: Examine the Comprehensive Project plans.	K4	
	CO5: Determine the mitigate risks associated with the Software development process.	K5	

Learning Resources				
Text Book	RobertT.Futrell, DonaldF.Shafer, LindaI.Safer,— Quality Software Project Management, Pearson Education Asia 2002.			
Reference Books	1. PankajJalote,— Software Project Management in Practice, Addison Wesley 2002. 2. Hughes,—Software Project Management, TataMc Graw Hill 2004,3rd Edition.			
Website Link	www.smartworld.com/notes/software-project-management			
Self-Study Material	https://blockchain.oodles.io/blog/blockchain-in-project-management/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE08	**SOFTWARE PROJECT MANAGEMENT**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	M	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	S	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.K.Vijayakumar	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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RASIPURAM - 637408.

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE09	**IMAGE PROCESSING**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students Learn about various 2D Image transformations, various image enhancement processing methods and filters, various classifications of Image segmentation techniques.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Digital Image Fundamentals:** Image representation - Basic relationship between pixels, Elements of DIP system - Applications of Digital Image Processing - 2DSystems - Classification of 2D Systems - Mathematical Morphology- Structuring Elements - MorphologicalImage Processing- 2D Convolution - 2D Convolution Through Graphical Method 2D Convolution Through Matrix Analysis.	K1	10
II	**2D Image transforms :** Properties of 2D-DFT-Walsh transform Hadamard transform - Haar transform - Discrete Cosine Transform Karhunen - Loeve Transform - Singular Value Decomposition.	K2	9
III	**Image Enhancement:** Spatial domain methods - Point processing Intensity transformations - Histogram processing -Spatial filtering smoothing filter- Sharpening filters. **Frequency domain methods:** low pass filtering, high pass Filtering - Homo morphic filter.	K3	9
IV	**Image segmentation:** Classification of Image segmentation techniques - Region approach – Clustering techniques Segmentation based on thresholding - Edge based segmentation Classification of edges - Edge detection - Hough transform - Active contour.	K4	10

V	**Image Compression:** Need for compression-Redundancy -Classification of image - Compression schemes - Huffman coding-Arithmetic coding Dictionary based compression-Transform based compression. ***CurrentTrends-Computer Vision and Natural Language Processing-Augmented Reality and Virtual Reality-Edge Computing and Internet of Things.**	K5	10
	…… Self Study.		
Course Outcome	**CO1:** Recall the fundamental concepts of digital image processing.	K1	
	CO2: Explain the various 2D Image transformations.	K2	
	CO3: Build the image enhancement processingtechniques and filters.	K3	
	CO4: Assume the classification of Image segmentation techniques.	K4	
	CO5: Determine the various image compression techniques.	K5	

Learning Resources				
Text Books	1. SJayaraman, SEsakkirajan, TVeerakumar, Digital image processing TataMcGrawHill,2015. 2. Gonzalez RafelC,Digital Image Processing, Pearson Education,2009.			
Reference Books	1. Jain AnilK, Fundamentals of digital image processing:,PHI,1988. 2. KennethR Castleman,Digital image processing:,Pearson Education,2/e,2003. 3. PrattWilliamK, Digital Image Processing:,JohnWiley,4/e,2007.			
Website Link	1.https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing%20-Vijaya%20Raghavan.pdf 2.http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203 3. https://dl.acm.org/doi/10.5555/559707			
Self-Study Material	1.https://www.linkedin.com/advice/3/what-top-image-processing-ai-trends-watch-k7o6e			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE09	**IMAGE PROCESSING**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.S.Shahana	**HoD – Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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RASIPURAM - 637408.

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE10	**INFORMATION SECURITY**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students Learn the objectives information security confidentiality, integrity, authentication and availability various cryptographic algorithms.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to Information Security:** Security mind set, Computer-Security Concepts(CIA), Attacks, Vulnerabilities and protections, Security Goals, Security Services, Threats, Attacks, Assets, malware, program analysis and mechanisms	K1	10
II	**The Security Problem in Computing:** The meaning of Computer Security, Computer Criminals, Methods of Defense. Cryptography: Concepts and Techniques: Introduction, Plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption.	K2	10
III	**Symmetric and Asymmetric Cryptographic Techniques:** DES, AES, RSA algorithms. Authentication and Digital Signatures: Use of Cryptography for authentication, Secure Hash function, Key management–Kerberos.	K3	8
IV	**Program Security :** Non-malicious Program errors – Buffer overflow, Incomplete mediation, Time-of check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels. File protection Mechanisms User Authentication Designing Trusted O.S: Security polices, models of security, trusted O.S design, Assurance in trusted O.S. Implementation examples.	K4	10
V	Security in Networks: Threats in networks, Network Security Controls Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security. Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction. ***Current Trends:** Digital Threat*	K5	10
	***……* Self Study.**		
	CO1: Recall Network security threats, services, and counter measures.	K1	

Course Outcome	**CO2:** Identifying vulnerability analysis of network security.	K2	
	CO3: Learn about hash functions, authentication methods, firewalls, and intrusion detection techniques for network security.	K4	
	CO4: Gain hands on experience with programming and simulation techniques for security protocols.	K4	
	CO5: Apply methods for authentication, access control, Intrusion detection and prevention.	K5	

Learning Resources	
Text Books	1. Security in Computing, Fourth Edition, by Charles P.P fleeger, Pearson Education 2. Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson.
Reference Books	1. Cryptography and Network Security CK Shyamala, NHarini, Dradmanabhan, Wiley India, lstEdition . 2. Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw Hill, 2"d Edition. 3. Information Security, Principles and Practice: Mark Stamp, Wiley India. 4. Principles of Computer Sceurity : WM. Arthur Conklin, Greg White, TMH.
Website Link	1. https://www.geeksforgeeks.org/what-is-information-security/ 2. https://www.tutorialspoint.com/what-is-information security#:~:text=Information%20security%20is%20designed%20and,destruction%2C%20alteration%2C%20and%20disruption.
Self-Study Material	1. https://www.enterprisenetworkingplanet.com/data-center/enterprise-networking-security-trends

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Title	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE10	**INFORMATION SECURITY**		**DSE THEORY**			**5**	**3**	**2**	**-**	**4**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.R.Suguna	**HOD - Dr.V.Vijayadeepa**	**Member Secretary - Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE11	**HUMAN COMPUTER INTERACTION**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**
Objective	Students Learn about the frame work of HCI. Designing rules in software process technologies for HCI models and theories.							

Unit	Course Content	Knowledge Levels	Sessions
I	**FOUNDATIONS OF HCI:** The Human: I/O channels–Memory. Reasoning and problem solving: The Computer: Devices Memory–processing and networks. Interaction: Models–frame works–Ergonomics – styles – elements – interactivity - Paradigms -Case Studies.	K1	12
II	**DESIGN & SOFTWARE PROCESS:** Interactive Design: Basics–process–scenarios. Navigation: screen design Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice–design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques–Universal Design.	K2	12
III	**MODELS AND THEORIES:** HCI Models: Cognitive models:-Socio-Organizational issues and stake holder requirements Communication and collaboration models-Hypertext, Multimedia and WWW.	K3	12
IV	**MOBILE HCI:** Mobile Eco system: Platforms, Application frame works Types of Mobile Applications: Widgets, Applications, Games Mobile Information Architecture, Mobile2.0, Mobile Design: Elements of Mobile Design, Tools. Case Studies.	K4	12
V	**WEB INTERFACE DESIGN:** Designing Web Interfaces – Drag &Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow -Case Studies. **Current Trends- * Interdisciplinary roots and trends ***	K5	12
	…… Self Study.		
	CO1: Learn the fundamentals of HCI.	K1	
	CO2: Construct the design rules for software process Technologies in various standards.	K2	
	CO3: Assess the HCI models and theories.	K3	

Course Outcome	**CO4**: Describe the Mobile Ecosystem, types of Mobile Applications, mobile Architecture and design.	K4
	CO5: Evaluate the various types of Web Interface.	K5

Learning Resources	
Text Books	1.AlanDix, Janet Finlay, Gregory Abowd, Russe Beale, Human-Computer Interaction,III Edition, Pearson Education, 2004(UNITI,II&III) 2.Brian Fling, Mobile Design and Development, I Edition, O_ReillyMedia Inc, 2009(UNIT–IV) 3.Bill Scott and Theresa Neil, Designing Web Interfaces, First Edition, O_Reilly, 2009.(UNIT-V)
Reference Books	1.Shneiderman, Designing the User Interface: Strategies for Effective Human-Computer Interaction, V Edition, Pearson Education.
Website Link	1.https://www.interaction-design.org/literature/topics/human-computer-interaction 2.https://link.springer.com/10.1007/978-0-387-39940-9_192
Self-Study Material	https://www.sciencedirect.com/science/article/abs/pii/S0164121298100262

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE11	**HUMAN COMPUTER INTERACTION**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	M	S	M	S	L	L	M	L
CO2	M	M	M	M	S	S	M	M	L	S
CO3	S	M	M	M	M	M	M	L	L	M
CO4	M	S	S	M	M	S	M	S	M	L
CO5	S	S	M	S	S	S	S	S	M	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.M.Purusothaman	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE12	**FUZZY LOGIC**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**
Objective	Students acquire a comprehensive understanding of Fuzzy Logic, membership functions, gaining proficiency in Defuzzification and Fuzzy Rule-Based Systems.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to Fuzzy Logic:** Fuzzy Sets - Fuzzy Set Operations, Properties of Fuzzy Sets. **Classical and Fuzzy Relations:** Introduction - Cartesian Product of Relation - Classical Relations - Cardinality of Crisp Relation.	K1	12
II	**Crisp Relation:** Operations on Crisp Relation - Properties of Crisp Relations - Composition of Fuzzy Relations, Cardinality of Fuzzy Relations - Operations on Fuzzy Relations - Properties of Fuzzy Relations - Fuzzy Cartesian Product and Composition - Tolerance and Equivalence Relations, Crisp Relation.	K2	12
III	**Membership Functions:** Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.	K3	12
IV	**Defuzzification:** Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods. **Fuzzy Rule-Based System:** Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules.	K4	12
V	**Applications of Fuzzy Logic:** Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System - Antilock Braking System and Vehicle Speed Estimation Using Fuzzy Logic. ***Current Trends- Fuzzy Logic Control System***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Recall the basics of Fuzzy sets, operations, and properties.	K1	
	CO2: Summarize the concepts of Cartesian product and composition in Fuzzy relations.	K2	

	CO3: Identify different fuzzification methods and recognize key features of membership functions within the context of Fuzzy Logic.	K3	
	CO4: Classifying defuzzification methods tailored specifically for real-time applications within the domain of Fuzzy Logic.	K4	
	CO5: Prove an applications using Fuzzy logic and its Relations.	K5	

Learning Resources				
Text Books	1. S.N. Sivanandam, S. Sumathi, and S.N. Deepa - "Introduction to Fuzzy Logic using MATLAB", Springer-Verlag Berlin Heidelberg, 2007.			
Reference Books	1. Guanrong Chen and Trung Tat Pham - "Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems". 2. Timothy J. Ross - "Fuzzy Logic with Engineering Applications".			
Website Link	1.https://www.javatpoint.com/fuzzy-logic 2.https://www.guru99.com/what-is-fuzzy-logic.html			
Self-Study Material	https://www.geeksforgeeks.org/fuzzy-logic-control-system/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE12	**FUZZY LOGIC**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.E.Natarajan	**HoD - Mr.G.Selvakumar**	**Member Secretary Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE13	**ARTIFICIAL INTELLIGENCE**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**

Objective	Students learn about the various concepts of AI Techniques and search Algorithm in AI.

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction: Concept of AI – history - current status – scope –agents – environments - Problem Formulations - Review of tree and graph structures - State space representation -Search graph and Search tree	K1	12
II	Search Algorithms : Random search - Search with closed and open list - Depth first and Breadth first search - Heuristic search -Best first search - AI algorithm - Game Search	K2	12
III	Probabilistic Reasoning: Probability - conditional probability -Bayes Rule - Bayesian Networks – representation - construction and inference - temporal model - hidden Markov model.	K3	12
IV	Markov Decision process : MDP formulation - utility theory -utility functions - value iteration - policy iteration and partially observable MDPs.	K4	12
V	Reinforcement Learning : Passive reinforcement learning direct utility estimation - adaptive dynamic programming - temporal difference learning - active reinforcement learning- Q learning Current Trends *AI in Gaming*	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Remember the various concepts of AI Techniques.	K1	
	CO2: Understand various Search Algorithm in AI.	K2	
	CO3 : Design probabilistic reasoning and models in AI.	K3	
	CO4: Analyze Markov Decision Process.	K4	
	CO5: Create various type of Reinforcement learning Techniques.	K5	

Learning Resources				
Text Books	1.Stuart Russell and Peter Norvig, —Artificial Intelligence: A Modern Approach‖ , 3rd Edition, Prentice Hall. 2.Elaine Rich and Kevin Knight, —Artificial Intelligence‖, Tata McGraw Hill			
Reference Books	1.Trivedi, M.C., —A Classical Approach to Artifical Intelligence‖, Khanna Publishing House, Delhi. 2.Saroj Kaushik, —Artificial Intelligence‖, Cengage Learning India, 2011 David Poole and Alan Mackworth, —Artificial Intelligence: Foundations for Computational Agents‖, Cambridge University Press 2010			
Website Link	1.NPTEL & MOOC courses titled Artificial Intelligence and Expert Systems 2.https://nptel.ac.in/courses/106106140/ 3.https://nptel.ac.in/courses/106106126/			
Self-Study Material	1.https://www.arm.com/glossary/ai-in gaming#:~:text=AI%20in%20gaming%20refers%20to,behavior%20in%20the%20game%20world. 2.https://in.element14.com/latest-trends-in-artificial-intelligence			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE13	**ARTIFICIAL INTELLIGENCE**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**	

CO Number	**PO1**	**PO2**	**PO3**	**PO 4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mr. V. Vengadesh	**HoD – Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE14	**MOBILE ADHOC NETWORK**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**
Objective	Students Understand ad-hoc network models, medium access protocols, routing protocols, security in the transport layer, and cross-layered design.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Introduction to ad-hoc networks– definition, characteristics features, applications. Characteristics of wireless channel, ad-hoc mobility models indoor and out-door models.	K1	12
II	**Medium Access Protocol:** MAC Protocols: Design issues, goals and classification. Contention based protocols with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15, HIPERLAN.	K2	12
III	**Network Protocols:** Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, QoSaware routing.	K3	12
IV	**End–end delivery and security:** Transport Layer: Issues in designing –Transport layer classification, ad-hoc transport protocols. Security issues in ad-hoc networks: issues and challenges, network security attacks, secure routing protocols.	K4	12
V	**Need for cross layer design,** cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of ad-hoc with Mobile IP networks. ***Current Trends - Delay Tolerant Networking ***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Recall concepts of Ad-hoc network models.	K1	
	CO2: Learn the concept of Medium Access Protocols (MAC).	K2	
	CO3: Sketch Network Routing Protocols, design issues and various types of Routing Algorithms.	K3	
	CO4: Categorize knowledge on Delivery and Security in Transport Layer	K4	
	CO5: Design cross layer techniques and Integration, of	K5	

	ad-hoc with Mobile IP networks		

Learning Resources	
Text Books	1.C. Siva Ram Murthy and B. S. Manoj, “Ad-hoc Wireless Networks Architecture and Protocols II Edition”, Pearson Edition, 2007 2. Charles E. Perkins, “Ad-hoc Networking”, Addison –Wesley, 2000
Reference Books	1. Stefa no Basagni, Marco Conti, Silvia Giordano and Ivans to jmenovic, “Mobile ad-hoc networking”, Wiley-IEEE press, 2004 2. Mohammad Ilyas, “The hand book of ad-hoc wireless networks”, CR Cpress, 2002. 3. T.Camp, J.Boleng, and V.Davies, “A Survey of Mobility Models for Ad-hoc Network”
Website Link	1. https://www.techtarget.com/searchnetworking/definition/delay-tolerant-network 2. https://www.ijert.org/mobile-ad-hoc-network
Self-Study Material	1. https://www.linkedin.com/pulse/mobile-ad-hoc-network-manet-market-navigating-si3le 2. https://ebookcentral.proquest.com/lib/inflibnet-ebooks/detail.action?docID=830216

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE14	**MOBILE ADHOC NETWORK**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	M	L	S	S
CO2	M	M	S	M	S	M	L	M	S	S
CO3	S	S	L	S	S	S	M	L	M	S
CO4	M	M	M	M	M	S	S	M	S	M
CO5	M	S	S	L	S	M	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.V.Krishnaveni	**HoD – Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE15	**COMPUTATIONAL INTELLIGENCE**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**
Objective	Students realize a new approach for analyzing and create flexible information processing of humans such as sensing, understanding, learning, recognizing, and thinking.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to AI**: Problem formulation – AI Applications – Problems – State Space and Search – Production Systems– Breadth First and Depth First– Travelling Salesman Problem – Heuristic Search techniques: Generate and Test – Types of Hill Climbing.	K1	12
II	**Fuzzy Logic Systems:** Notion of fuzziness – Operations on fuzzy sets – Tnorms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification –Fuzzy Clustering–fuzzy rule Based classifier.	K2	12
III	**Neural Networks**: What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Back propagation Learning, Variation of Standard Back Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications.	K3	11
IV	**Artificial Neural Networks:** Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs–McCulloch Pitts Neuron–Linear Separability–Hebb Network.	K4	12
V	**Genetic Algorithm:** Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm– Simple GA – General Genetic Algorithm– Operators in Genetic Algorithm.	K5	13

	Current Trends: Optimization in the sensor cloud: Taxonomy, challenges, and survey.		
	…… Self Study.		
Course Outcome	**CO1:** Recalling the basics of AI and its search.	K1	
	CO2: Understanding the Fuzzy logic systems.	K2	
	CO3: Presenting the concepts of Neural Network and its functions.	K3	
	CO4: Illustrating the concepts of Artificial Neural Network.	K4	
	CO5: Posting genetic algorithm.	K5	

Learning Resources				
Text Books	1.Stuart Russell and Peter Norvig,—Artificial Intelligence-A Modern Approach,2nd Edition, Pearson Education in Asia. 2.S.Rajasekaran,G.A.Vijayalakshmi,—Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, PHI.			
Reference Books	1.F.Martin,Mcneill,and Ellen Thro,—Fuzzy Logic: A Practical approach, AP Professional,2000.ChinTeng Lin, C.S.George Lee, Neuro-Fuzzy Systems, PHI. 2.ChinTengLin,C.S.George Lee, Neuro-Fuzzy Systems, PHI.			
Website Link	1.https://www.javatpoint.com/artificial-intelligence-tutorial 2.https://www.w3schools.com/ai/			
Self-Study Material	https://shop.elsevier.com/books/recent-trends-in-computational-intelligence-enabled-research/bhattacharyya/978-0-12-822844-9			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE15	**COMPUTATIONAL INTELLIGENCE**	**DSE THEORY**		**5**	**5**	**-**	**-**	**5**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	S	S	S	S	S	M	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	S	S	S	M	S	M	S	S	S	S
CO5	M	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs. N.Hyrunnisha	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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RASIPURAM - 637408.

B.C.A Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE16	**GRID COMPUTING**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students comprehend the basic of Grid computing, recognize the various tool kits and frameworks available within the field.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Early Grid Activity, Current Grid Activity, Overview of Grid Business areas, Grid Applications, Grid Infrastructures.	K1	10
II	**Grid Computing organization and their Roles:** Organizations Developing Grid Standards, and Best Practice Guidelines, Global Grid Forum (GCF), #Organization Developing Grid Computing Tool kits and Framework #, Organization and building and using grid based solutions to solve computing, commercial organization building and Grid Based solutions.	K2	12
III	**Grid Computing Anatomy:** The Grid Problem, The conceptual of virtual organizations, # Grid Architecture # and relationship to other distributed technology.	K3	12
IV	**The Grid Computing Road Map:** Autonomic computing, Business on demand and infrastructure virtualization, Service-Oriented Architecture and Grid,# Semantic Grids#.	K4	12
V	**Merging the Grid services Architecture with the Web Services Architecture:** Service-Oriented Architecture, Web Service Architecture, #XML messages and Enveloping#, Service message description Mechanisms, Relationship between Web Services and Grid Services, Web services Interoperability and the role of the WS-I Organization.* **Current Trends –Problem Solving Environment*.**	K5	14
	…… Self Study.		
Course Outcome	**CO1:** Recall the basic elements and concepts of Grid computing.	K1	
	CO2: Identify the Grid computing tool kits and Framework.	K2	
	CO3: Apply concept of Anatomy of Grid Computing.	K3	
	CO4: Develop the service oriented architecture.	K4	
	CO5: Valid the knowledge on grid and web service architecture.	K5	

Learning Resources				
Text Books	1 Joshy Joseph and Craig Fellen stein, Grid computing, Pearson/IBM Press, PTR, 2004.			
Reference Books	1. Ahmer Abbas and Graig computing, A Practical Guide to technology and applications, Charles River Media,2003.			
Website Link	1. https://en.wikipedia.org/wiki/Grid_computing 2. https://link.springer.com/chapter/10.1007/978-1-84882-409-6_4 3. https://www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf			
Self-Study Material	1.https://en.wikipedia.org/wiki/Problem_solving_environment 2. https://ebookcentral.proquest.com/lib/inflibnet-ebooks/reader.action?docID=574578			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

B.C.A Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE16	**GRID COMPUTING**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	L	M	L	M	S	L	M	L
CO2	M	L	M	L	S	M	L	M	L	S
CO3	S	M	L	L	L	S	M	L	L	L
CO4	S	S	S	M	L	S	S	S	M	L
CO5	M	S	L	M	S	M	S	L	M	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
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BCA - Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE17	**CLOUD COMPUTING**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students Learn the fundamental concepts and Technologies of Cloud Computing.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to Cloud Computing**: Definition and Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples– Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing –Scalability and Elasticity –Deployment – Replication – Monitoring –Software Defined Networking–Network Function Virtualization–Map Reduce–Identity and Access Management–Service Level Agreements–Billing.	K1	10
II	**Cloud and Compute Services:** Amazon Elastic Computer Cloud – Google Compute Engine-Windows Azure Virtual Machines Storage Services Amazon Simple Storage Service - Google Cloud Storage Windows Azure Storage Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service Application Services: Application Runtimes and Frameworks – Queuing Services-Email Services - Notification Services-Media Services Content Delivery Services: Amazon Cloud Front Windows Azure Content Delivery Network Analytics Services: Amazon Elastic Map Reduce - Google Map Reduce Service - Google Big Query-Windows Azure HD Insight Deployment and Management Services :Amazon Elastic Bean stack Amazon Cloud Formation Identity and Access Management Services :Amazon Identify and Access Management - Windows Azure Active Directory Open Source Private Cloud Software: Cloud Stack– Eucalyptus – Open Stack.	K2	14
III	**Cloud Application Design**: Introduction – Design Consideration For Cloud Applications–Scalability–Reliability and Availability– Security –Maintenance and Up gradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture(SOA),Cloud Component Model,IaaS,PaaS and SaaS	K2	12

	Services for Cloud Applications, Model View Controller (MVC), Restful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach(NoSQL).		
IV	**Cloud Application Bench marking and Tuning**: Introduction to Bench marking – Steps in Bench marking – Workload Characteristics –Application Performance Metrics– Design Consideration for Bench marking Methodology–Bench marking Tools and Types of Tests –Deployment Prototyping. Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization–Identity and Access Management –Data Security: Securing data at rest, securing data in motion –Key Management–Auditing.	K3	12
V	**Case Studies:** Cloud Computing for Healthcare – Cloud Computing For Energy Systems - Cloud Computing for Transportation Systems -Cloud Computing for Manufacturing Industry Cloud Computing for Education. **Current Trends : * New cloud computing technologies***	K4	12
	…… Self Study.		
Course Outcome	**CO1:** Define the fundamental concepts and Technologies in Cloud Computing.	K1	
	CO2: Demonstrate various cloud service types And their uses and pitfalls.	K2	
	CO3: Construct the Cloud Architecture and Application design.	K3	
	CO4: Examine the various aspects of Application design, bench marking and security in the Cloud.	K3	
	CO5: Compare various Case Studies in Cloud Computing.	K4	

Learning Resources	
Text Books	1.ArshdeepBahga, VijayMadisetti, *CloudComputing – AHandsOnApproach*, UniversitiesPress(India)Pvt.Ltd.,2018.
Reference Books	1. Anthony T Velte, TobyJVelte, Robert Elsenpeter, Cloud Computing :A Practical Approach, Tata McGraw-Hill,2013. 2. BarrieSosinsky, *CloudComputingBible*, WileyIndiaPvt.Ltd.,2013. 3. DavidCrookes, *CloudComputinginEasySteps*, TataMcGrawHill,2015. 4. Dr. KumarSaurabh, *CloudComputing*, WileyIndia,SecondEdition2012.
Website Link	1. https://en.wikipedia.org/wiki/Cloud_computing. 2. https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7. 3. https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838CDW-Cloud-Computing-Reference-Guide.pdf.
Self-Study Material	1. https://www.youtube.com/watch?v=jW0Y5SimnwM.

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE17	**CLOUD COMPUTING**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	S	S	S	M	S
CO2	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	M	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.M.Ravi	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE18	**ARTIFICIAL NEURAL NETWORK**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students Understand the basics of artificial neural networks, learning process, single layer and multi - layer perceptron networks.							

Unit	Course Content	Knowledge Levels	Sessions
I	Artificial Neural Model - Activation functions - Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms-Error correction - Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem.	K1	12
II	Introduction , Error correction learning , Memory - based learning , Hebbian learning , Competitive learning , Boltzmann learning , credit assignment problem , Learning with and without teacher, learning tasks, Memory and Adaptation.	K2	12
III	Single layer Perception: Introduction, Pattern Recognition, Linear classifier, Simple perception, Perception learning algorithm, Modified Perception learning algorithm, Adaptive linear combiner, Continuous perception, Learning in continuous perception. Limitation of Perception.	K3	12
IV	Multi-Layer Perception Networks: Introduction, MLP with 2 hidden layers, Simple layer of a MLP, Delta learning rule of the output layer, Multilayer feed forward neural network with continuous perceptions, Generalized delta learning rule, Back propagation algorithm	K4	12
V	Deep learning- Introduction- Neuro architectures building blocks for the DL techniques, Deep Learning and Neocognitron, Deep Convolutional Neural Networks, Recurrent Neural Networks (RNN), feature extraction, Deep Belief Networks, Restricted Boltzmann Machines, Training of DNN and Applications. ***Current Trends- Multi Modal AI***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Remember the basics of artificial neural networks with single layer and multi-layer perception networks.	K1	
	CO2: Illustrate the Error Correction and various Learning algorithms and tasks.	K2	
	CO3: Analyse the various Perception Learning Algorithm.	K3	
	CO4: Apply the various Multi-Layer Perception Network.	K4	

	CO5: Evaluate the Deep Learning of various Neural network and its Applications.		K5	
Learning Resources				
Text Books	1. Neural Networks A Classroom Approach – Satish Kumar, McGrawHill – Second Edition. 2. Neural Network – A Comprehensive Foundation – Simon Haykins, Pearson Prentice Hall, 2nd Edition, 1999.			
Reference Books	Artificial Neural Networks - B.Yegnanarayana, PHI, NewDelhi 1998.			
Website Link	1.https://www.w3schools.com/ai/ai_neural_networks.asp 2.https://en.wikipedia.org/wiki/Artificial_neural_network 3.https://link.springer.com/chapter/10.1007/978-3-642-21004-4_12			
Self-Study Material	1. https://www.techtarget.com/searchenterpriseai/tip/9-top-AI-and-machine-learning-trends 2. https://cloud.google.com/use-cases/multimodal-ai			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAE18	**ARTIFICIAL NEURAL NETWORK**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**	

CO - PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	M	S	M	M	L
CO2	S	S	M	M	M	S	M	S	M	S
CO3	M	M	S	S	M	S	L	M	M	M
CO4	S	S	M	S	S	M	S	S	L	S
CO5	M	M	S	M	S	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.A.Raja	**HoD - Mr.G.Selvakumar**	**Member Secretary-Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE19	**AGILE PROJECT MANAGEMENT**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**
Objective	Students Learn the basic concepts of software design, technologies and API's and also to demonstrate Agile development, planning, execution and testing techniques.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction: Modernizing Project Management**: Project Management Needed a Makeover –Introducing Agile Project Management. **Applying the Agile Manifesto and Principles**: Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 15 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values – The Agile litmus test. **Why Being Agile Works Better:** Evaluating Agile benefits – How Agile approaches beat historical approaches? – Why people like being Agile?	K1	12
II	**Being Agile: Agile Approaches**: Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, Extreme Programming –Summary. **Agile Environments in Action:** Creating the physical environment – Low tech communicating – High – tech communicating –Choosing tools. **Agile Behaviours in Action:** Establishing Agile roles – Establishing new values – Changing team philosophy.	K2	12
III	**Agile Planning and Execution**: **Defining the Product Vision and Roadmap**: Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog. **Planning Releases and Sprints:** Refining requirements and estimates – Release planning –Sprint planning. **Working Throughout the Day:** Planning your day–Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day. **Showcasing Work, Inspecting and Adapting:** The sprint review – The sprint retrospective. **Preparing for Release:** Preparing the product for deployment (the release sprint) –Preparing the operational support – Preparing the organization for product deployment - Preparing the marketplace for product deployment.	K3	12

IV	**Agile Management Managing Scope and Procurement:** What's different about Agile scope management – Managing Agile scope – What's different about Agile procurement – Managing Agile procurement. **Managing Time and Cost**: What's different about Agile time management – Managing Agile schedules – What's different about Agile cost management –Managing Agile budgets. **Managing Team Dynamics and Communication:** What's different about Agile team dynamics – Managing Agile team dynamics –What's different about Agile communication – Managing Agile communication. **Managing Quality and Risk:** What's different about Agile quality – Managing Agile quality –What's different about Agile risk management – Managing Agile risk.	K4	12
V	**Implementing Agile Building a Foundation**: Organizational and individual commitment – Choosing the right pilot team members – Creating and environment that enables Agility – Support Agility initially and overtime. **Being a Change Agent**: Becoming Agile requires change – why change doesn't happen on its own – Platinum Edge's Change Roadmap – Avoiding pitfalls –Signs your changes are slipping. **Benefits, Factors for Success and Metrics**: Ten key benefits of Agile project management – Ten key factors for project success – Ten metrics for Agile Organizations. ***Current Trends: Agile Trends 2024: The Next Wave of Agile Transformation***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Remember software design, software Technologies and APIs using Agile Management.	K1	
	CO2: Identify the Agile development and testing techniques.	K2	
	CO3: Apply the steps of Agile Planning and Execution using Sprint.	K3	
	CO4: Analyze Agile Management Design, scope, Procurement, managing Time and Cost and Quality Check.	K4	
	CO5: Implement Agile testing techniques, factors for success and metrics.	K5	

Learning Resources	
Text Books	1. Mark C.Layton, Steven J.Ostermiller, Agile Project Management for Dummies, 2nd Edition, Wiley India Pvt. Ltd., 2018. 2. Jeff Sutherland, Scrum – The Art of Doing Twice the Work in Half the Time, Penguin,2014

Reference Books	1. Mark C.Layton, David Morrow, Scrum for Dummies, 2nd Edition, Wiley India Pvt.Ltd., 2018. 2. Mike Cohn, Succeeding with Agile – Software Development using Scrum, Addison – Wesley Signature Series, 2010. 3. Alex Moore, Agile Project Management, 2020. 4. Alex Moore, Scrum, 2020 5. Andrew Stellmanand Jennifer Greene, Learning Agile: Understanding Scrum, XP, Lean, and Kanban, Shroff / O'Reilly, First Edition, 2014.			
Website Link	1.www.agilealliance.org/resources			
Self-Study Material	1. https://www.holaspirit.com/blog/agile-trends-2024-what-is-the-next-wave-of-agile-transformation			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAE19	**AGILE PROJECT MANAGEMENT**	**DSE THEORY**		**5**	**3**	**2**	**-**	**4**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	L	M	S	L	M	L
CO2	S	S	M	M	M	S	L	M	L	S
CO3	M	M	M	S	M	S	M	L	L	S
CO4	M	M	M	S	S	S	M	S	M	L
CO5	L	M	S	S	S	M	S	L	M	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**MICROPROCESSOR AND MICRO CONTROLLER**			**5**	**5**	**-**	**-**	**5**
Objective	Students Learn the explore internal organization, instruction sets, and interfacing with peripheral devices, preparing them for real-world applications in embedded systems.							

Unit	Course Content	Knowledge Levels	Sessions
I	Digital Computers -Microcomputer Organization Computer languages Microprocessor Architecture and its operations –Microprocessor initiated operations and 8085 Bus organization – Internal Data operations and 8085 registers - Peripheral or External initiated operations.	K1	12
II	8085 Microprocessor – Pin out and Signals–Functional block diagram-8085 Instruction Set and Classifications.	K2	12
III	BCD to Binary and Binary to BCD conversions - ASCII to BCD and BCD to ASCII conversions - Binary to ASCII and ASCII to Binary conversions. BCD Arithmetic-BCD addition and Subtraction Multi byte Addition and Subtraction-Multiplication and Division.	K3	12
IV	The 8085 Interrupts – RIMANDSIM instructions-8259 Programmable Interrupt Controller Direct Memory Access (DMA) and 8257 DMA controller.	K4	12

V	Introduction to Micro controller - Micro controller Vs. Microprocessor -8051 Micro controller architecture - 8051 pin description. Timers and Counters–Operating Modes-Control Registers. Interrupts Interrupts in 8051-Interrupts Control Register–Execution of interrupt. **Current Trends:*Micro controller Vs Microprocessor***	K5	12
	***……* Self Study.**		
Course Outcome	**CO1:** Recall the binary concepts are used in Microprocessor programming.	K1	
	CO2: Illustrate the 8085 instruction set and Their classifications.	K2	
	CO3: Applying different types of instructions to convert Binary codes and analyzing the outcome.	K3	
	CO4: Analyze peripheral devices are connected to 8085using Interrupts and DMA controller.	K4	
	CO5: Assess real time applications using Micro controller.	K5	

Learning Resources	
Text Books	1.R.S. Gaonkar-"Microprocessor Architecture Programming and Applications with 8085"-5th Edition ,Pen ram International Publications,2009.[For unit I to unit IV] 2. Soumitra Kumar Mandal -Microprocessos and Micro controllers Architectures, Programming and Interfacing using 8085,8086,8051,Tata Mc Graw Hill Education Private Limited. [for unit V]
Reference Books	1. Mathur-Introduction to Microprocessor-3rd Edition-TataMcGraw-Hill-1993. 2. RajKamal—Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education, 2005. 3. KrisnaKant,—Microprocessors and Micro controllers–Architectures, Programming And System Design 8085,8086,8051,8096,PHI,2008.
Website Link	1.Web resources from NDL Library,E-content from open source libraries 2. https://www.bing.com/
Self-Study Material	1. https://www.theiotacademy.co/blog/microprocessor-vs-microcontroller/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Title	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**MICROPROCESSOR AND MICRO CONTROLLER**					**5**	**5**	**-**	**-**	**5**

CO-PO Mapping

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mrs.R.Suguna	**HoD - Mr.G.Selvakumar**	**Member Secretary Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
RASIPURAM - 637408.

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAP_	**MICROPROCESSOR AND MICROCONTROLLER**			**4**	**-**	**-**	**4**	**2**
Objective	Students Learn the various instruction set sand classifications AND assembly language programs using 8085.							

S.No	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Addition and Subtraction 1. 8-bit addition 2. 16-bit addition 3. 8-bit subtraction 4. BCD subtraction	K1	10
2	II. Multiplication and Division 1. 8-bit multiplication 2. BCD multiplication 3. 8-bit division	K2	10
3	III. Sorting and Searching 1. Searching for an element in an array. 2. Sorting in Ascending and Descending order. 3. Finding the largest and smallest elements in an array. 4. Reversing array elements. 5. Block move.	K3	10
4	IV. Code Conversion 1. BCD to Hex and Hex to BCD 2. Binary to ASCII and ASCII to binary 3. ASCII to BCD and BCD to ASCII	K4	10

5	V. Simple programs on 8051 Micro controller 1. Addition 2. Subtraction 3. Multiplication 4. Division 5. Interfacing Experiments using 8051 I. Realisation of Boolean Expression through ports. II. Time delay generation using subroutines. III. Display LEDs through ports	K5	10
Course Outcome	**CO1:** Recall the Basic binary code sand their conversions.	K1	
	CO2: Illustrate the 8085 instruction set and their Classifications.	k2	
	CO3: Applying different types of instructions to convert Binary codes and analyzing the outcome.	K3	
	CO4: Demonstrate peripheral devices are connected to 8085 Using Interrupts and DMA controller.	K4	
	CO5: Assess real time applications using micro controller.	K5	

Learning Resources				
Text Books	1.R.S.Gaonkar-"Microprocessor Architecture-Programming and Applications with 8085"-5thEdition-Penram International Publications, 2009.[For unit I to unit IV]. 2.Soumitra Kumar Mandal-—Microprocessors and Micro controllers–Architectures, Programming and Interfacing using 8085,8086,8051‖,TataMcGraw Hill Education Private Limited.[for unit V].			
Reference Books	1. Mathur-—Introduction to Microprocessor‖-3rdEdition-TataMcGraw-Hill-1993. 2. RajKamal-—Micro controllers:Architecture,Programming,Interfacing and System Design‖,Pearson Education,2005. 3. Krishna Kant,—Micro processors and Micro controllers–Architectures,Programming andSystemDesign8085,8086,8051,8096‖,PHI,2008.			
Website Link	1.https://www.bing.com/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAP_	**MICROPROCESSOR AND MICROCONTROLLR**			**4**	**-**	**-**	**4**	**2**	

CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	M	S	S	L	L	M	S	S
CO2	M	S	L	M	S	S	M	S	S	S
CO3	S	L	S	S	M	S	S	M	M	S
CO4	M	S	S	S	S	M	M	S	S	S
CO5	M	S	M	M	M	S	M	S	M	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Sample programs to related topic
Teaching and Learning Methods	Handling practical session through projector
Assessment Methods	Attendance, Observation, Model practical's

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Mrs.R.Suguna	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**SOFTWARE ENGINEERING**			**5**	**5**	**-**	**-**	**5**
Objective	Students Learn the basics of analysis and design of software engineering principles and techniques, testing at various levels and produce an efficient system.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction**: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Not able changes in software development practices, computer systems engineering. **Software Life Cycle Models:** Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.	K1	12
II	**Requirements Analysis and Specification:** Requirements gathering and analysis, Software requirements specification (SRS). **Software Design**: Good software design, cohesion and coupling, neat arrangement, software design approaches, object-oriented vs function-oriented design.	K2	12
III	**Function-Oriented Software Design:** Overview of SA/SD methodology, structured analysis, dataflow diagrams (DFD's), structured design, detailed design. **User-Interface design:** Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.	K3	12
IV	**Coding and Testing:** Coding; code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing; debugging; program analysis tools; integration testing; system testing; some general issues associated with testing. **Software Reliability and Quality Management:** Software reliability; statistical testing; software quality; software quality management system; SEI capability maturity model; personal software process.	K4	12

V	**Computer Aided Software Engineering:** CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment. **Software Maintenance:** Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost. **Current Trends*** : **Software Metrics – Benefits of Software Metrics**	K5	12
	***Self-Study**		
Course Outcome	**CO1:** Recall the basics of Software Engineering Process.	K1	
	CO2: Illustrate the software engineering principles and Techniques.	K2	
	CO3: Demonstrate the Function-Oriented Design with Data Flow Diagrams.	K3	
	CO4: Categorize the Coding and Testing Methods.	K4	
	CO5: Evaluate Testing at various levels and produce an efficient system.	K5	

Learning Resources				
Text Books	1. Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018.			
Reference Books	1. Richard Fairley, Software Engineering Concepts, TataMcGraw-Hill publishing company Ltd, Edition 1997. 2. Roger S.Pressman, Software Engineering, Seventh Edition, McGraw-Hill. 3. James A.Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.			
Website Link	1. https://www.geeksforgeeks.org/software-engineering-introduction-to-software-engineering/ 2. https://www.javatpoint.com/software-engineering			
Self-Study Material	1. https://stackify.com/track-software-metrics/			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAC_	**SOFTWARE ENGINEERING**			**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	S	S	S	M	M	S
CO2	S	M	M	M	S	S	M	S	M	S
CO3	M	M	S	S	M	M	S	M	M	M
CO4	S	M	M	M	S	S	M	S	M	M
CO5	S	S	M	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mr.T.Prabhu	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**MACHINE LEARNING TECHNIQUES**			**5**	**5**	**-**	**-**	**5**
Objective	Students Learn the Machine Intelligence and its applications. Implement and apply machinelearning algorithms to real-world applications, create instant based learning.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction Machine Learning:** Difference between AI, Machine Learning and Big data. Supervised and unsupervised learning, parametric vs. non-parametric models, parametric models for classification and regression Linear Regression, Logistic Regression, Naïve-Bayes classifier, simple non-parametric classifier-K-nearest neighbour, support vector machines.	K1	12
II	**Neural networks and Genetic Algorithms:** Neural Network Representation Problems – Perceptron's – Multilayer Networks and Back Propagation Algorithms – Advanced Topics– Genetic Algorithms Hypothesis Space Search–Genetic Programming–Models of Evaluation and Learning.	K2	12
III	**Bayesian and computational learning Bayes:** Bayesian Theorem –Concept Learning Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier Bayesian Belief Network – EM Algorithm – Probability Learning Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.	K3	12
IV	**Instant based learning:** K-Nearest Neighbor Learning-Locallyweighted Regression–Radial Basis Functions–Case Based Learning.	K4	12

V	**Advanced learning:** Recommendation systems opinion mining, sentiment analysis - Learning Sets of Rules Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules–Induction on Inverted Deduction Inverting Resolution–Analytical Learning–Perfect Domain Theories Explanation Base Learning–FOCL Algorithm–Reinforcement Learning Task–Q- Learning– Temporal Difference Learning. **Current Trends- *vision-based machine learning***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Recall the importance of visualization in the data analytics solution.	K1	
	CO2: Relate the concept of structured thinking to unstructured problems.	K2	
	CO3: Mark the very broad collection of machine learning algorithms and problems	K3	
	CO4: Assess the algorithmic topics of machine learning and mathematically deep enough to introduce the required.	K4	
	CO5: Compose the appreciation for what is involved in learning from data.	K5	

Learning Resources	
Text Books	1. Tom.M. Mitchell, Machine Learning, McGraw-Hill Education (India) Private Limited,2013. 2.Bengio, Yoshua, IanJ.Goodfellow, and AaronCourville, "Deeplearning"2015, MIT Press
Reference Books	1. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004. 2. Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
WebsiteLink	https://www.javatpoint.com/robotics-tutorial
Self-Study Material	https://www.sciencedirect.com/science/article/abs/pii/S0957417422013033

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**MACHINE LEARNING TECHNIQUES**						**5**	**5**	**-**	**-**	**5**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mr.M.Purusothaman	**HOD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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BCA LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAP_	**MACHINE LEARNING**			**5**	**-**	**-**	**5**	**3**
Objective	Students Learn the concepts of Machine Learning to solve real world problems and to implement basic algorithms in clustering & classification applied to text & numeric data.							

S.No.	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Solving Regression & Classification using Decision Trees	K1	6
2	Root Node Attribute Selection for Decision Trees using Information Gain	K2	6
3	Bayesian Inference in Gene Expression Analysis	K1	6
4	Pattern Recognition Application using Bayesian Inference	K2	6
5	Bagging in Classification	K3	6
6	Bagging, Boosting applications using Regression Trees	K2	6
7	Data & Text Clustering using K-means algorithm	K1	6
8	Using Weka tool for SVM classification for chosen domain application	K3	6
9	Data & Text Clustering using K-means algorithm	K3	6
10	Data & Text Clustering using Gaussian Mixture Models	K3	6

Course Outcome	**CO1:** Name uses of various machine learning tools	K1
	CO2: Summarize the procedures for machine learning algorithms	K2
	CO3: Model Python programs for various machine learning algorithms	K3
	CO4: Inspect appropriate data sets to the Machine Learning algorithms	K3
	CO5: Design the graphical outcomes of learning algorithms with specific data sets	K4

Learning Resources				
Text Books	3. Tom.M. Mitchell, Machine Learning, McGraw-Hill Education (India) Private Limited,2013. 4. Bengio, Yoshua, IanJ.Goodfellow, and AaronCourville, "Deeplearning"2015, MIT Press			
Reference Books	3. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004. 4. Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC Press, 2009.			
Website Link	https://www.javatpoint.com/dbms-tutorial			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAP_	**MACHINE LEARNING**			**5**	**-**	**-**	**5**	**3**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M- MEDIUM	S-STRONG

Tutorial Schedule	Sample programs to related topics
Teaching and Learning Methods	Handling practical session through projector
Assesment Methods	Attendance, Observation, Model Practical's.

Designed By	Verified By	Approved By
Mr.M.Purusothaman	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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RASIPURAM - 637408.

B.C.A Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**NETWORK SECURITY**			**5**	**4**	**1**	**-**	**4**
Objective	Student Learn the fundamental principles of public-key cryptography, including RSA and other cryptosystems and analyze their mechanisms.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Model of network security** – Security attacks, services and attacks –OSI security architecture Classical encryption techniques–SDES Block cipher Principles DES–Strength of DES Block cipher design principles–Block cipher mode of operation –Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis Placement of encryption function –traffic confidentiality.	K1	12
II	**Number Theory**–Prime number–Modular arithmetic Euclid's algorithm-Fermet's and Euler's theorem – Primality –Chinese remainder theorem Discrete logarithm–Public key cryptography and RSA –Key distribution –Key management Diffie Hellman key exchange Elliptic curve cryptography	K2	12
III	**Authentication requirement**–Authentication function MAC–Hash function–Security of hash function and MAC–SHA-HMAC–CMAC-Digital signature and authentication protocols–DSS.	K3	12
IV	**Authentication applications** – Kerberos X.509 Authentication services-E mail security–IP security –Web security	K4	12
V	**Intruder** – Intrusion detection system – Virus and related threats–Countermeasures Firewalls design principles–Trusted systems Practical implementation of cryptography and security**.*Current Trends - IoT Security***.	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Recall the concepts of classical encryption techniques and block ciphers.	K1	
	CO2: Describe public-key cryptography, RSA and other public-key cryptosystems.	K2	
	CO3: Design the key management and distribution schemes and design User Authentication.	K3	
	CO4: Analyze and design hash and MAC algorithms, and digital signatures.	K4	
	CO5: Summarize the Intruders and Intruder Detection mechanisms, Types of Malicious software.	K5	
Learning Resources			

Text Books	William Stallings,—Cryptography & Network Security‖, Pearson Education, Fourth Edition2010.			
Reference Books	1. Charlie Kaufman, Radia Perlman, Mike Speciner,—Network Security, Private communication in public world‖, PHI Second Edition,2002 2. Bruce Schneier, Neils Ferguson,—Practical Cryptography‖, Wiley Dream tech India Pvt Ltd, First Edition,2003. 3. Douglas R Simson—Cryptography– Theory and practice ‖,CRC Press, First Edition,1995			
Website Link	1. https://www.javatpoint.com/computer-network-security 2.https://www.tutorialspoint.com/information_security_cyber_law/network_security.htm 3. https://www.geeksforgeeks.org/network-security/			
Self-Study Material	1.https://www.thinkconsulting.com/whats-new/the-top-five-latest-trends-in-network-security/ 2. https://ebookcentral.proquest.com/lib/inflibnet-ebooks/reader.action?docID=821875			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

B.C.A Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAC_	**NETWORK SECURITY**			**5**	**4**	**1**	**-**	**4**	

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	L	L	S	M	M	L	L
CO2	M	M	M	M	M	M	M	M	M	M
CO3	S	M	M	M	L	S	M	M	M	L
CO4	S	M	S	L	L	S	M	S	L	L
CO5	S	M	S	L	L	S	M	S	L	L

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG
Tutorial Schedule	Group Discussion, Quiz program, Model preparation		
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation		
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE		

Designed By	**Verified By**	**Approved By**
Mrs.K.Gayathri	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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BCA - Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**DATA MINING AND WAREHOUSING**			**5**	**5**	**-**	**-**	**4**

Objective	To Provide the knowledge on Data Mining and Warehousing concepts and techniques.

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Data mining – Functionalities–Classification – Introduction to Data Warehousing– Data Reprocessing: Processes sing the Data – Data cleaning – Data Integration and Transformation–Data Reduction.	K1	12
II	**Data Mining Primitives:** Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language - Architecture of Data mining Systems. Concept Description - Characterization And Comparison: Concept Description - Data Generalization and Summarization - Analytic Characterization - Mining Class Comparison – Statistical Measures.	K2	12
III	**Mining Association Rules:** Basic Concept – Single Dimensional Boolean Association Rules From Transaction Databases - Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.	K3	12
IV	**Classification and Prediction:** Introduction – Issues – Decision Tree Induction–Bayesian Classification – Classification of Back Propagation. Classification Based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy.	K3	12
V	**Cluster Analysis:** Introduction – Types of Data in Cluster Analysis -Petitioning Methods – Hierarchical Methods- Density Based Methods– GRID Based Method–Model based Clustering Method. **Current Trends : * Data mining new trend ***	K4	12
	…… Self Study.		
Course Outcome	**CO1:** Recall the basic concepts and the functionality of the various data mining and data warehousing component.	K1	
	CO2: Illustrate the concepts of Data mining system architectures.	K2	
	CO3: Describe the principles of association rules.	K3	
	CO4: Analyse Classification and prediction method.	K3	

	CO5: Apply knowledge on Cluster analysis and its methods.		K4	
Learning Resources				
Text Books	1.Han and M.Kamber,—DataMiningConceptsandTechniques‖,2001,Harcourt India Pvt. Ltd, New Delhi. 2.Tortora, G.J., Funke, B.R., Case,C.L. (2013). Microbiology. An Introduction 11th Edition. A La Carte Pearson.			
Reference Books	1.K.P.Soman,ShyamDiwakar,V.Ajay—Insight into Data Mining Theory and Practice—,Prentice Hall of India Pvt.Ltd, New-Delhi. 2.Parteek Bhatia, Data Mining and Data Warehousing :Principles and Practical Techniques', Cambridge University Press,2019.			
Website Link	1. https://www.top coder.com/thrive/articles/data-warehousing-and-data mining#:~:text=Data%20warehousing%20is%20a%20method,compiled%20in%20 the %20data%20warehouse. 2..https://www.javat point.com/data-mining-cluster-vs-data-warehousing. 3. https://www.tutorials point.com/Data-Warehousing-and-Data-Mining.			
Self-Study Material	https://www.youtube.com/watch?v=m4fsyny5ofc.			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**DATA MINING AND WAREHOUSING**						**5**	**5**	**-**	**-**	**4**

CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	M	S	M	S	S	S	S	M
CO3	M	M	S	S	S	M	M	M	S	S
CO4	S	S	M	M	L	S	S	S	S	M
CO5	L	S	S	S	S	L	S	S	S	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mr.M.Ravi	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**MOBILE APPLICATION DEVELOPMENT**			**5**	**5**	**-**	**-**	**5**
Objective	Student Learn the Android architecture and features, implement different view options, manage data effectively with file handling.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Android Fundamentals:** Android overview and Versions – Features of Android – Architecture of Android - Setting up Android Environment (Eclipse/Android Studio, SDK, AVD) - Anatomy of an Android Application - Simple Android Application Development.	K1	12
II	**Android User Interface:** Layouts (Linear, Relative, Frame, and Scroll View) - Managing changes to Screen Orientation. **Views:** Text View, Button, Image Button, Edit Text, Check Box, Radio Button, Radio Group, Progress Bar, Auto Complete Text View, List Views, and Web View.	K2	12
III	**Data Persistence:** Saving and Loading User Preferences. **File Handling:** File System - Internal and External Storage - Permissions - File Manipulation - Managing Data using SQLite: Creation of database, Insertion, Retrieval, and Updation of records.	K3	12
IV	**SMS Messaging:** Sending and Receiving messages - Sending E-mail. **Networking:** Downloading Binary Data - Downloading Text Files.	K4	12
V	Location Based Services: Displaying maps - Displaying zoom control - Changing view - Adding Markers - Getting the location - Geocoding. **Publishing Android Applications:** Preparing for publishing - Deploying APK Files. **Current Trends- *Internet of Things (IoT) App Integration*.**	K5	12
	…… Self Study.		
	CO1: Find the importance of visualization in the data analytics solution.	K1	

Course Outcome	**CO2**: Use structured thinking for unstructured problems.			K2	
	CO3: Build a wide range of machine learning algorithms and problems.			K3	
	CO4: Learn algorithmic topics of machine learning and mathematically deepen to introduce the required theory.			K4	
	CO5: Develop an understanding of the complexities involved in learning from data.			K5	
Learning Resources					
Text Books	WeiMeng Lee (2012), "Beginning Android Application Development", Wrox Publications (John Wiley, New York).				
Reference Books	EdBurnette, "Hello Android: Introducing Google's Mobile Development Platform", 3rd edition, 2010, Th Pragmatic Publishers. Reto Meier,"ProfessionalAndroid4ApplicationDevelopment",2012,Wrox Publications (John Wiley, New York).				
Website Link	https://www.tutorialspoint.com/mobile_development_tutorials.htm				
Self-Study Material	https://www.gartner.com/en/information-technology/glossary/iot-integration				
	L-Lecture	T-Tutorial	P-Practical	C-Credit	

CA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAC_	**MOBILE APPLICATION DEVELOPMENT**			**5**	**5**	**-**	**-**	**5**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.E.Natarajan	**HoD - Mr.G.Selvakumar**	**Member Secretary Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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BCA LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAP_	**MOBILE APPLICATION DEVELOPMENT**			**5**	**-**	**-**	**5**	**2**
Objective	Students Learn the user-defined functions and the concepts of classes, demonstrate the creation of cookies and sessions.							

S.No.	**List of Experiments / Programmes**	**Knowledge Levels**	**Sessions**
1	Develop an application for Simple Counter.	K1	3
2	Develop an application to display your personal details using GUI Components.	K2	3
3	Develop a Simple Calculator that uses radio buttons and Text View.	K1	3
4	Develop an application that uses Intent and Activity.	K2	3
5	Develop an application that uses Dialog Boxes.	K3	3
6	Develop an application to display a Splash Screen.	K2	3
7	Develop an application that uses Layout Managers.	K1	4
8	Develop an application that uses different types of Menus.	K3	3
9	Develop an application that sends messages from one mobile to another mobile.	K3	3
10	Develop an application that sends E-mail.	K3	3
11	Develop an application that plays Audio and Video.	K4	3
12	Develop an application for Local File Storage.	K4	4
13	Develop an application for Login Page using SQLite.	K3	4
14	Develop an application for Student Mark sheet processing using SQLite.	K4	3
Course Outcome	**CO1:** Recall the concepts of counter and dialogs.	K1	
	CO2: Comprehend the concepts of Layout Managers. To perform sending email, audio, and video.	K2	
	CO3: Enable the application of audio and video. To apply Local File Storage and development of files.	K3	
	CO4: Determine the concepts of Simple Animation. To apply searching pages.	K3	

	CO5: Utilize the usage of student mark sheet preparation in MAD.	K4

Learning Resources				
Text Books	1. WeiMeng Lee (2012), "Beginning Android Application Development", Wrox Publications (John Wiley, New York).			
Reference Books	1.EdBurnette, "Hello Android: Introducing Google's Mobile Development Platform",3rd edition, 2010, Th Pragmatic Publishers. 2.Retoeier,"ProfessionalAndroid4ApplicationDevelopment",2012,Wrox Publications (John Wiley, New York).			
Website Link	https://www.tutorialspoint.com/mobile_development_tutorials.htm			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAP_	**MOBILE APPLICATION DEVELOPMENT**			**5**	**-**	**-**	**5**	**2**	

CO-PO Mapping

CO Number	PO 1	PO 2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Sample programs to related topics
Teaching and Learning Methods	Handling practical session through projector
Assessment Methods	Attendance, Observation, Model practical

Designed By	Verified By	Approved By
Mr.E.Natarajan	**HOD - Mr.G.Selvakumar**	**Member Secretary Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**INTRODUCTION TO DATA SCIENCE**			**5**	**5**	**-**	**-**	**5**
Objective	To Learn the various data collection and integration, exploratory data analysis, predictive modelling, descriptive modelling and effective communication.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science.	K1	12
II	**The Data science process:** Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building - Data Visualization.	K2	12
III	**Algorithms:** Machine learning algorithms – Modelling process – Types – Supervised – Unsupervised - Semi-supervised.	K3	12
IV	**Introduction to Hadoop:** Hadoop framework – Spark – replacing Map Reduce– No SQL – ACID – CAP – BASE – types.	K3	12
V	**Case Study:** Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation. **Current Trends* : Machine Leraning - Machine Learning vs deep learning – Machine Learning Methods***	K4	12

Course Outcome	**CO1:** Recall the scope and applications of data science.		K1	
	CO2: Summarize the Data Science Process.		K2	
	CO3: Utilize the basic principles and techniques of machine learning.		K3	
	CO4: Develop the Hadoop framework and it types.		K3	
	CO5: Examine the different fields of data science and machine learning.		K4	
Learning Resources				
Text Books	1.Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications 2016 2. Roger Peng, "The Art of Data Science", lulu.com 2016. 3. MurtazaHaider, "Getting Started with Data Science – Making Sense of Data with Analytics", IBM press, E-book.			
Reference Books	1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali,"Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools", Dreamtech Press 2016. 2. Annalyn Ng, Kenneth Soo, "Numsense! Data Science for the Layman: No Math Added", 2015,1st Edition 3. Cathy O'Neil, Rachel Schutt, "Doing Data Science Straight Talk from the Frontline", O'Reilly Media 2013. 4. Lillian Pierson, "Data Science for Dummies", 2015 II Edition			
Website Link	1. https://www.w3schools.com/datascience/ds_introduction.asp 2. https://www.geeksforgeeks.org/introduction-to-data-science/			
Self-Study Material	1. https://www.ibm.com/topics/machine-learning 2. https://www.manning.com/books/introducing-data-science			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAC_	**INTRODUCTION TO DATA SCIENCE**						**5**	**5**	**-**	**-**	**5**
CO-PO Mapping											
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	S	S	M	S	S	S	S	M	M	S	
CO2	S	S	S	S	S	S	M	S	M	S	
CO3	S	M	S	S	S	M	S	M	M	M	
CO4	S	S	M	S	S	M	S	S	M	M	
CO5	S	S	M	S	S	S	M	S	S	S	
Level of Correlation between CO and PO				L-LOW			M-MEDIUM		S-STRONG		
Tutorial Schedule				Group Discussion, Quiz program, Model preparation							
Teaching and Learning Methods				Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation							
Assessment Methods				Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE							
Designed By				**Verified By**			**Approved By**				
Mr.T.Prabhu				**HoD - Mr.G.Selvakumar**			**Member Secretary - Dr.S.Shahitha**				

List of Skill Based Elective Course (SEC) for B.C.A.,
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S.No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1		23M_UCAS01	Fundamentals of Information Technology
2		23M_UCAS02	Introduction to HTML
3		23M_UCAS03	Web Designing
4		23M_UCAS04	PHP Programming
5		23M_UCAS05	Software Testing
6		23M_UCAS06	Problem Solving Techniques
7		23M_UCAS07	Office Automation
8		23M_UCAS08	Quantitative Aptitude
9		23M_UCAS09	Open Source Software Technologies
10		23M_UCAS10	Multimedia Systems
11		23M_UCAS11	Advanced Excel
12		23M_UCAS12	Biometrics
13		23M_UCAS13	Cyber Forensics
14		23M_UCAS14	Pattern Recognition
15		23M_UCAS15	Enterprise Resource Planning
16		23M_UCAS16	Robotics and Applications
17		23M_UCAS17	Simulation and Modelling
18		23M_UCAS18	Organization Behavior
19		23M_UCAS19	Understanding Internet

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS01	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students understand basic concepts and terminology of information technology.							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction to Computers - Generations of Computer – Data and Information – Components of Computer – Software – Hardware – Input Devices - Output Devices – Types of Operating System.	K1	6
II	MS Word: Introduction – Elements of Window – Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment - Bullets and Numbering - Header and footer watermark – inserting objects (images, other application document) – Table creation – Mail merge.	K2	6
III	Ms Excel: Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.	K3	6
IV	MS PowerPoint: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).	K3	6
V	Internet: Introduction to Internet and Intranet – Services of Internet -Domain Name – URL – Browser – Types of Browsers – Search Engine -E-Mail – Basic Components of E-Mail –.How to send group mail. E Commerce: Digital Signature – Digital Currency – Online shopping and transaction.	K4	6

Course Outcome	**CO1: L**earn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	**K1**
	CO2: Develop organizational structure using for the devices present currently under input or output unit.	**K2**
	CO3: Design the concept of storing data in computer using two headers namely RAM and ROM with different types.	**K4**
	CO4: Apply different software and its applications.	**K3**
	CO5: Examine the system software which really acts as an interpreter between software and hardware.	**K4**
Learning Resources		
Text Books	1.Anoop Mathew, S. KavithaMurugeshan (2009), — Fundamental of Information Technology‖, Majestic Books. 2.Alexis Leon, Mathews Leon,‖ Fundamental of Information Technology‖, 2nd Edition. 3.S. K Bansal, —Fundamental of Information Technology‖.	
Reference Books	1.BhardwajSushilPuneet Kumar, —Fundamental of Information Technology‖ 2.GG WILKINSON, —Fundamentals of Information Technology‖, Wiley-Blackwell 3.A Ravichandran , —Fundamentals of Information Technology‖, Khanna Book Publishing.	
Website Link	1.https://testbook.com/learn/computer-fundamentals 2.https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html 3.https://www.javatpoint.com/computer-fundamentals-tutorial 4.https://www.tutorialspoint.com/computer_fundamentals/index.htm 5.https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf.	

L-Lecture	**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS01	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	M	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	M	M	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG
Tutorial Schedule	Group Discussion, Quiz program, Model preparation		
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation		
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE		

Designed By	**Verified By**	**Approved By**
Mrs.N.Padmavathi **Mr.K.Vijayakumar**	**HoD – Dr.V.Vijayadeepa**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS02	**INTRODUCTION TO HTML**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students Learn the Concepts of ordered and unordered lists within a web page and Create a web page.							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction: Web Basics: What is Internet – Web browsers – What is Webpage – HTML Basics: Understanding tags.	K1	6
II	Tags for Document structure (HTML, Head, Body Tag). Block level text elements: Headings paragraph (<p> tag).Font style elements: (bold, italic, font, small, strong, strike, big tags).	K2	6
III	Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR Using Images – Creating Hyperlinks.	K3	6
IV	Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan –Cell padding.	K3	6
V	Frames: Frameset – Targeted Links – No frame. Forms: Input, Text area, Select, Option.	K4	6
Course Outcome	**CO1:** To Discuss about the basic concept in HTML and Concept of resources in HTML.	**K1**	
	CO2: To Identify the Concept of Meta Data, Understand the concept of save the files.	**K2**	
	CO3: To Execute the page formatting and Concept of list.	**K3**	
	CO4: To Differentiate Links and Know the concept of creating link to email address.	**K3**	
	CO5: To Design the Concept of adding images and Understand the table creation.	**K4**	

Learning Resources				
Text Book	"Mastering HTML5 and CSS3 Made Easy", TeachUComp Inc., 2014.			
Reference Book	Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”.			
Website Link	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf https://www.w3schools.com/html/default.asp.			
L-Lecture		**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS02	**INTRODUCTION TO HTML**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	M	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	M	M	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.N.Padmavathi **Mr.K.Vijayakumar**	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS03	**WEB DESIGNING**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**

Objective	Students learn the basics of HTML and its components, Graphics in HTML, the concepts of XML and DHTML , Java script & the concept of Ajax.

Unit	Course Content	Knowledge Levels	Sessions
I	**HTML**: HTML Introduction- tag basics- page structure Adding comments working with texts, paragraphs and line break. Emphasizing test Heading and horizontal rules-list-font size, face and color Alignment links-tables-frames.	K1	5
II	**Forms & Image Using Html:** Graphics Introduction. How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms text box, password, list box, combo box, text area, tools for Building web page front page.	K2	6
III	**XML & DHTML:** Cascading style sheet (CSS)- what is CSS-Why we use CSS-adding CSS to your web pages-Grouping styles Extensible markup language(XML).	K3	5
IV	**Dynamic HTML**: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling data binding. JavaScript: Client-side scripting, What is JavaScript, How to develop Java Script, simple Java Script, variables, functions, conditions, loops and repetition,	K4	6
V	Advance script, Java Script and objects, Java Script own objects, the DOM and web browser environments, forms and validations. ***Current Trends: Advance script***	K5	6
	***……* Self Study.**		
Course Outcome	**CO1:** Identify the working knowledge of HTML	K1	
	CO2: Describe the publish Web pages using Hypertext Mark-up Language (HTML).	K2	
	CO3: Assess to optimize page styles and layout with Cascading Style Sheets (CSS).	K3	
	CO4: Develop a java script using CSS	K4	
	CO5: Create a web application using Ajax.	K5	

Learning Resources	
Text Books	1. PankajSharma, Web Technology, SkKataria & Sons Bangalore 2011. 2. MikeMcgrath, JavaScript, 1stEdition DreamTechPress2006.

	3 AchyutSGodbole & AtulKahate, Web Technologies, 2ndEdition ,2002.			
Reference Books	1.LauraLemay,RafeColburn,JenniferKyrnin,—Mastering HTML,CSS & Javas cript Web Publishing,2016. 2. DTEditorialServices(Author),—HTML5BlackBook(CoversCSS3,JavaScript,XML, XHTML, AJAX, PHP, jQuery), 2ndEdition, Paperback 2016.			
Website Link	1.https://www.geeksforgeeks.org			
Self-Study Material	https://www.netclues.com/blog/top-web-development-trends			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS03	**WEB DESIGNING**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.R.Suguna	**HoD – Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS04	**PHP PROGRAMMING**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**

Objective	Students Learn the necessary knowledge to design and develop web application development techniques and knowledge on OOPS		
Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	**Introduction to PHP:** Basic Knowledge of websites - Dynamic Website- Scope of PHP XAMPP and WAMP Installation.	K1	8
II	**Basics of PHP Programming:** Syntax of PHP-Embedding PHP in HTML Embedding HTML in PHP. PHP Variable - Understanding Data Types Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement.	K2	8
III	**Control Statements and Functions:** Switch() Statements-Using the while() Loop-Using the for() Loop PHP Functions. PHP Functions-Creating an Array-Modifying Array Elements Processing Arrays with Loops-Grouping Form Selections with Arrays-Using Array Functions.	K3	8
IV	**PHP File Concepts**: Reading and Writing Files -Reading Datafrom a file.	K4	8
V	Managing Sessions and Using Session Variables-Destroying a Session Storing Data in Cookies-Setting Cookies. **Current Trends- * The evolution of PHP web applications***	K5	8
	…… Self Study.		
Course Outcome	**CO1:** Learn the PHP scripts to handle processor.	K1	
	CO2: Outline the regular expressions including modifiers, operators, and meta characters.	K2	
	CO3: Construct the Program using the concept of array.	K3	
	CO4: Select the uses of various PHP library functions	K4	
	CO5: Create a website.	K5	

Learning Resources				
Text Books	1.Lynnmighley and Michael Morrison, Head First PHP & MySQL: A Brain-Friendly Guide-2009 2.Alan Forbes, The Joy of PHP: A Beginner's Guide to Programming Interactive WebApplications with PHP and MySQL			
Reference Books	1. Steven Holzner, PHP: The Complete Reference. 2. DTEditorial Services (Author), HTML5 Black Book (CoversCSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery),Paperback2016,2ndEdition.			
WebsiteLink	1. Refer MOOC Courses like NPTEL and SWAYAM 2. https://www.w3schools.com/php/default.asp			
Self-Study Material	https://www.sciencedirect.com/science/article/abs/pii/S0950584915002062			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS04	**PHP PROGRAMMING**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	S	S	S	M	S	S	M	S
CO3	M	M	M	S	S	S	S	S	M	S
CO4	M	S	S	M	S	S	M	M	S	S
CO5	S	S	S	M	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.M.Purusothaman	**HOD - Mr.G.Selvakumar**	**Member Secretary -Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
RASIPURAM - 637408.

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS05	**SOFTWARE TESTING**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**

Objective	Students understand the basic black box software testing concepts, and communicate testing progress with your project team.		
Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	**Introduction:** Purpose–Productivity and Quality in Software– Testing Vs Debugging– Model for Testing– Bugs– Types of Bugs – Testing and Design Style.	K1	6
II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation – Application– Transaction Flow Testing Techniques	K2	6
III	Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing	K3	6
IV	Linguistic–Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing– Formats–Test Cases.	K3	6
V	Logic Based Testing – Decision Tables–Transition Testing– States, State Graph, State Testing. ***Current Trends - The Future of Digital Experience Testing*.**	K4	6
	…… Self Study.		
Course Outcome	**CO1:** Recall the basic concepts of functional (black box) software testing.	K1	
	CO2: Identify the basic application of techniques used to identify useful ideas for tests.	K2	
	CO3: Construct the mission and communicate the status of your testing with the rest of your project team	K3	
	CO4: Characterize a good bug report, peer-review the reports of your colleagues, and improve your own report writing	K3	
	CO5: Design testing concepts within the context of unified processes.	K4	

Learning Resources	
Text Books	1. B.Beizer, “Software Testing Techniques”, Dream Tech India, New Delhi, 2003. 2. K.V.K.Prasad, “Software Testing Tools”,DreamTech. India, New Delhi, 2005.
Reference Books	1. Burn stein, 2003,“PracticalSoftwareTesting”,Springer International Edn. 2. Kit, 1995, “Software Testing in the Real World: Improving the Process”, Pearson Education, Delhi. 3. R.Rajani and P, P.Oak, 2004, “SoftwareTesting”, TataMcgrawHill, NewDelhi
Website Link	1. https://www.techtarget.com/whatis/definition/software-testing 2.https://www.testim.io/blog/software-testing-basics/
Self-Study Material	https://www.lambdatest.com/blog/software-testing-trends/

	L-Lecture	T-Tutorial	P-Practical	C- Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS05	**SOFTWARE TESTING**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	L	S	S	S	S	M
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS06	**PROBLEM SOLVING TECHNIQUES**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**
Objective	Students understand about the problem-solving techniques, including pattern recognition, abstraction, and systematic debugging.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction**: Notion of algorithms and programs– Requirements for solving problems by computer – The problem-solving aspect: Problem definition phase, Getting started on a problem, The use of specific examples, Similarities Among problems, Working backwards from the solution–General problem solving strategies- Problem solving using to p-down design– Implementation of algorithms–The concept of Recursion	K1	8
II	**Fundamental Algorithms**: Exchanging the values of two variables – Counting – Summation of a set of numbers- Factorial computation-Sine function computation - Fibonacci Series generation - Reversing the digits of an integer – Base Conversion.	K2	8
III	**Factoring Methods**: Finding the square root of a number – The smallest divisor of an integer – Greatest common divisor of two integers - Generating prime numbers – Computing the prime factors of an integer – Generation of pseudo-random numbers -Raising a number to a large power– Computing the nth Fibonacci number.	K3	8
IV	**Array Techniques**: Array order reversal – Array counting or his to graming – Finding the maximum number in a set - Removal of duplicates from an ordered array- Partition in array– Finding the k smallest element– Longest monotone sub sequence.	K4	8
V	**Text Processing and Pattern Searching:** Text line length adjustment – Left and right justification of text – Keyword searching in text – Text line editing – Linear pattern search. Recursive algorithms: Towers of Hanoi–Permutation generation Current Trends-* Reflect and review. .. *	K5	8
	***……* Self Study.**		

Course Outcome	**CO1:** Remember the logic of problem and analyses implementation of algorithm and Top Down approach and concept of Recursion.	K1	
	CO2: Understand the Sequence of Numbers and Series Fibonacci, Reversing, Base Conversion.	K2	
	CO3: Apply to do Algebraic operations.	K3	
	CO4: Analyze of Arrays and its Logics.	K4	
	CO5: Create Text Processing and Pattern Searching Approach	K5	

Learning Resources				
Text Books	R.G.Dromey,HowtoSolveitbyComputer,PearsonIndia,2007			
Reference Book	1. George Polya, Jeremy Kilpatrick, The Stanford Mathematics Problem Book: WithHints andSolutions,DoverPublications,2009(KindleEdition2013). 2. GregW. Scragg, Problem Solving with Computers,Jones&Bartlett1stedition, 1996.			
Website Link	https://www.linkedin.com/advice/3/what-your-approach-staying-current-problem-solving			
Self-Study Material	https://www.javatpoint.com/problem-solving-techniques-in-ai			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS06	**PROBLEM SOLVING TECHNIQUES**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**

CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS07	**OFFICE AUTOMATION**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**
Objective	Provide students with practical training in Microsoft Office, and enhance their proficiency in editor, spreadsheet, and presentation software.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introductory concepts:** Memory unit – CPU - Input **Devices:** Key board, Mouse and Scanner. **Output devices:** Monitor, Printer. **Introduction to Operating systems &its features:** DOS– UNIX–Windows. Introduction to Programming Languages	K1	6
II	**Word Processing:** Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing– Preview, options, merge.	K2	6
III	**Spreadsheets**: Excel-opening, entering extend data, formatting, navigating; Formulas – entering, handling and copying; Charts–creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics	K3	6
IV	**Database Concepts:** The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive application sin query language	K4	6
V	**Power point:** Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition– Animation effects, audio inclusion, timers. ***Current Trends - Cloud-Based Office Automation Solutions***	K5	6
	…… Self Study.		
Course Outcome	**CO1:** Learn the basics of computer systems and its components.	K1	
	CO2: Understand the basic concepts of a word processing package.	K2	
	CO3: Apply the basic concepts of electronic spreadsheet application	K3	

	CO4: Implement the database management system.	K4	
	CO5: Create a presentation using PowerPoint tool.	K5	

Learning Resources				
Text Books	1. Peter Norton, “Introduction to Computers”, 6th Edition, Tata McGraw Hill			
Reference Books	1. Joyce Cox, Curtis Frye, M. Dow Lambert III, Steve Lambert, John Pierce, Joan Preppernau, “Microsoft office system 2007”, 2nd Edition, PHI Learning pvt.			
Website Link	1.https://www.w3schools.com/sql 2. https://www.tutorialspoint.com/sql			
Self-Study Material	1.https://start.docuware.com/glossary/cloud-office-automation 2.https://ebookcentral.proquest.com/lib/inflibnet-ebooks/reader.action?docID=1449748&query=Cloud-Based+Office+Automation+Solutions			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Title	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS07	**OFFICE AUTOMATION**			**SEC THEORY**			**3**	**1**	**2**	**-**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS08	**QUANTITATIVE APTITUDE**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**

Objective	Students learn various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

Unit	Course Content	Knowledge Levels	Sessions
I	**Numbers** - HCF and LCM of numbers-Decimal fractions Simplification – Square root and cube roots - Average Problems on Numbers.	K1	6
II	Problems on Ages - Surds and Indices- percentage - profits and loss - ratio and proportion -partnership - Chain rule.	K2	6
III	Time and work - pipes and cisterns-Time and Distance - problems on trains - Boats and streams - simple interest - compound interest - Logarithms Area Volume and surface area - races and Games of skill.	K3	6
IV	Permutation and combination - probability True Discount - Bankers Discount – Height and Distances Odd manout & Series.	K4	6
V	Calendar - Clocks - stocks and shares - Data representation Tabulation – Bar Graphs - Pie charts-Line graphs. ***Current Trends : Factorials ,Shortcuts in averages ***	K5	6
	***……* Self Study.**		
Course Outcome	**CO1:**Recall the basic concepts of numbers	K1	
	CO2: Understand the concept of percentage, profit & loss.	K2	
	CO3: Apply the basic concepts of time and work, interests.	K3	
	CO4: Analyze the concepts permutation, probability, discounts.	K4	
	CO5: Evaluate the concepts of data representation, graphs.	K5	

Learning Resources				
Text Books	1.Quantitative Aptitude,R.S.AGGARWAL.,S. Chand & Company Ltd.,			
Website Link	1. https://www.javatpoint.com/aptitude/quantitative 2. https://www.toppr.com/guides/quantitative-aptitude/			
Self-Study Material	https://www.imsindia.com/blog/cat/how-to-prepare-for-cat-quantitative-aptitude/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS08	**QUANTITATIVE APTITUDE**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**	

CO - PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	S	S	S	S	S	M	S	S	S
CO2	S	M	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	S	S	S	M	S	M	M	S	S	S
CO5	M	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs. N.Hyrunnisha	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS09	**OPEN SOURCE SOFTWARE TECHNOLOGIES**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**

Objective	Students Learn the Basics of Open Source Technologies.

Unit	Course Content	Knowledge Levels	Sessions
I	**Open Source**–open source vs. commercial software–What is Linux–Free Software–Where I can use Linux –Linux kernel Linux Distributions.	K1	8
II	**Introduction Linux Essential Commands** –File System concept Standard Files –The Linux Security Model – Introduction to Unix Unix Components Unix Files – File Attributes and Permission Standard I/O–Redirection–Pipes and Filters–Grep and Stream Editor.	K2	8
III	**Introduction**-Apache Explained–Starting, Stopping and Restarting Apache–Modifying the Default configuration– Securing Apache–Set user and Group.	K3	8
IV	**MySQL:** Introduction to MySQL – The show databases and table – The USE command–Create Database and Tables–Describe Table–Select, Insert, Update and Delete statement database.	K4	8
V	Introduction–PHP Form processing–Database Access with PHP–MySQL, MySQL Functions–Inserting Records Selecting Records–Deleting Records–Update Records**.** ***Current Trends-Open Source Software for Sustainability*.**	K5	8
	*……*Self Study.		
Course Outcome	**CO1:** Recall the basic concepts in Java application of OOPS Concepts.	K1	
	CO2: Describe the knowledge about operators and decision-Making statements.	K2	
	CO3: Identify the significance and application of Classes, Arrays and interfaces and analyzing java arrays.	K3	
	CO4: Apply the applications of OOPS concepts and analyze Overriding and packages through java programs.	K4	
	CO5: Create window-based programming using applet and Graphics programming..	K5	

Learning Resources

Text Books	1.James Lee and Brent Ware—Open Source Web Development with LAMPusing2 2.Dorling Kindersley-LINUX,Apache,MySQL,PerlandPHP‖,,2008				
Reference Books	1.Eric Roseb rock, Eric Filson,—Setting up LAMP: Getting Linux, Apache, MySQL and PHP and working together‖, John Wiley and Sons,2004. 2.Anthony Butcher,—Teach Yourself MySQL in 21days‖,2nd Edition,SamsPublication. 3.Rich Bower, Daniel Lopez Ridreejo, AlianLiska,—Apache Administrator's Hand book‖, Sams Publication. 4.Tammy Fox,—Red Hat Enterprise Linux 5 Administration Unleashed‖, Sams Publication. 5.Nara more Eligabette, Gerner Jason,Wrox Press,Wiley DreamtechPress, —BeginningPHP5,Apache,MySQLWebDevelopment‖,2005.				
Website Link	1.Introduction to Open-Source and its benefits-Geeks for Geeks 2.https://www.bing.com/				
Self-Study Material	1.https://binariks.com/blog/emerging-blockchain-technology-trends/#:~:text=Blockchain%20trends%20are%20changing%20business,very%20popular%20and%20constantly%20growing. 2.https://ebookcentral.proquest.com/lib/inflibnet-ebooks/detail.action?docID=3039658				
	L-Lecture	T-Tutorial	P-Practical	C-Credit	

B.C.A Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS09	**OPEN SOURCE SOFTWARE TECHNOLOGIES**	**SEC THEORY**		**3**	**1**	**2**	**-**	**2**	

CO - PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS10	**MULTIMEDIA SYSTEMS**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students Learn the multimedia systems, Image File and Sounds Audio File Formats, Animation and Digital Video Containers and Multimedia Project.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Multimedia Text**: About Fonts and Faces Using Text in Multimedia -Computers and Text Font Editing and Design Tools-Hypermedia and Hypertext.	K1	6
II	**Images** : Plan Approach-Organize Tools Configure Computer Workspace- 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 - Vaughan's Law of Multimedia Minimums Adding Sound to Multimedia Project.	K2	6
III	**Animation:** The Power of Motion- Principles of Animation - Animation by Computer-Making Animations that Work. Video: Using Video -Working with Video and Displays Digital Video Containers - obtaining Video Clips Shooting and Editing Video.	K2	6
IV	**Making Multimedia:** The Stage of Multimedia Project-The Intangible Needs -The Hardware Needs - The Software Needs -An Authoring Systems Needs- Multimedia Production Team.	K3	6
V	**Planning and Costing** :The Process of Making Multimedia - Scheduling Estimating -RFPs and Bid Proposals. Designing and Producing- Content and Talent: Acquiring Content Ownership of Content Created for reject Acquiring Talent. **Current Trends : *** Demands Placed on Hardware by Multimedia Systems *	K3	6
	…… Self Study.		
Course Outcome	**CO1:** Understand the concepts, importance, application and The process of developing multimedia.	K1	
	CO2: Identify Basic knowledge and understanding about image related processing	K2	
	CO3: Develop the frame work of frames and Bit images to animations.	K3	
	CO4: Classify about the multimedia projects and stages of requirement in phases of project.	K4	
	CO5: Simplify the concept of cost involved in Multimedia planning, designing, and producing.	K4	

Learning Resources				
Text Books	1.TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGraw Hill,2001.			
Reference Books	1.Ralf Steinmetz &KlaraNahrstedt "Multimedia Computing, Communication &Applications" Pears on Education,2012.			
Website Link	1.https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics. 2. https://www.youtube.com/watch?v=ZXUTIpytCdo.			
Self-Study Material	1.https://www.youtube.com/watch?v=81omTrkO5uw.			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS10	**MULTIMEDIA SYSTEMS**	**SEC THEROY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	M	M	S	S	S	S	S
CO2	S	S	S	S	M	M	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	M	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS11	**ADVANCED EXCEL**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students Learn Handle large amounts of data, Aggregate numeric data and summarize into categories and subcategories, Filtering, sorting, and grouping data or subsets of data.							

Unit	Course Content	Knowledge Levels	Sessions
I	Basics of Excel - Customizing common options - Absolute and relative cells-Protecting and un-protecting worksheets and cells - Working with Functions - Writing conditional expressions – logical functions-lookup and reference functions - HLookUP with Exact Match , Approximate Match-Nested HLookUP with Exact Match - HLookUP with Tables, Dynamic Ranges-Nested HLookUP with Exact Match-Using HLookUP to consolidate Data from Multiple Sheets.	K1	6
II	Data Validations - Specifying a valid range of values - Specifying a list of valid values - Specifying custom validations based on formula -Working with Templates Designing the structure of a template -templates for standardization of worksheets - Sorting and Filtering Data - Sorting tables-multiple - level sorting - custom sorting-Filtering data for selected view - advanced filter options - Working with Reports Creating subtotals - Multiple - level subtotal.	K2	6
III	Consolidating data from multiple sheets and files using Pivot tables-external data sources-data consolidation feature to consolidate data-Show Value As % of Row, %of Column, Running Total, Compare with Specific Field-Viewing Subtotal under Pivot-Creating Slicers	K3	6
IV	More Functions Date and time functions-Text functions-Database functions-Power Functions – Formatting Using auto formatting option for worksheets-Using conditional formatting option for rows , columns and cells- WhatIf Analysis- Goal Seek-Data Tables-Data Connection-Scenario Manager.	K4	6
V	Charts -Formatting Charts-3D Graphs-Bar and Line Chart together-Secondary Axis in Graphs-Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Spark lines-Macros-Indexing-Overview of all the new features. **Current Trends - *Pivot Tables***	K5	6
	…… Self Study.		
	CO1: Recall big data tools and its analysis techniques	K1	

Course Outcome	**CO2**: Analyze data by utilizing clustering and classification algorithms.	K2	
	CO3:Apply different mining algorithms and recommendation systems for large volumes of data.	K3	
	CO4: Demonstrate the analytics on data streams.	K4	
	CO5: Assess No-SQL databases and management.	K5	

Learning Resources				
Text Books	1.Excel 2019 All 2.Microsoft Excel 2019 Pivot Table Data Crunching			
Reference Books	1.Mastering Advanced Excel Paperback – 21 July 2023 by Ritu Arora			
Website Link	1. https://www.tutorialspoint.com/advanced_excel/index.htm 2. https://www.w3schools.com/EXCEL/index.php			
Self-Study Material	1.https://en.wikipedia.org/wiki/Pivot_table 2.https://www.simplilearn.com/tutorials/excel-tutorial/pivot-table			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS11	**ADVANCED EXCEL**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	M	M	M	L	S
CO2	S	S	M	M	M	S	M	M	L	L
CO3	M	M	M	S	S	S	M	L	M	L
CO4	M	M	M	S	S	S	S	M	M	M
CO5	M	M	S	M	M	S	M	L	S	L

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.A.Raja	**HoD - Mr.G.Selvakumar**	**Member Secretary- Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS12	**BIOMETRICS**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students Learn the basic concepts and the functionality of the Biometrics, Face Biometrics, Types, Architecture and its Applications.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction**: What is Biometrics, History, Types of biometric Traits, General architecture of biometric systems, Basic working of biometric matching, Biometric system error and performance measures, Design of biometric system, Applications of biometrics, Biometrics versus traditional authentication methods. **Face Biometrics:** Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages.	K1	5
II	**Retina and Iris Biometrics**: Introduction, Performance of Biometrics, Design of Retina Biometrics, Design of Iris Recognition System, Iris Segmentation Method, Determination of Iris Region, Determination of Iris Region, Applications of Iris Biometrics, Advantages and Disadvantages. **Vein and Finger print Biometrics**: Introduction, Biometrics Using Vein Pattern of Palm, Finger print Biometrics, Finger print Recognition System, Minutiae Extraction, Finger print Indexing, Experimental Results, Advantages and Disadvantages.	K2	5
III	**Privacy Enhancement Using Biometrics**: Introduction, Privacy Concerns Associated with Biometric Deployments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics. **Multimodal Biometrics**: Introduction to Multimodal Biometrics, Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics and Advantages of Multimodal Biometrics, Characteristics and Advantages of Multimodal Biometrics.	K3	5
IV	**Watermarking Techniques**: Introduction, Data Hiding Methods, Basic Framework of Water marking, Classification of Water marking, Applications of Water marking, Attacks on	K4	5

	Watermarks, Performance Evaluation, Characteristics of Watermarks, General Water marking Process, Image Water marking Techniques, Water marking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Attacks on Spatial Domain Water marking.		
V	**Scope and Future**: Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics, Biometrics and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometrics, Radio Frequency Identification (RFID) Biometrics, DNA Biometrics, Comparative Study of Various Biometric Techniques. **Biometric Standards:** Introduction, Standard Development Organizations, Application Programming Interface (API), Information Security and Biometric Standards, Biometric Template Interoperability. **Current Trends: *AI-Powered Biometrics***	K5	5
	…… Self Study.		
Course Outcome	**CO1:** Recall the basic concepts and the functionality of The Biometrics, Face Biometrics, Types, Architecture and Applications.	K1	
	CO2: Illustrate the concepts Retina and Iris Biometrics and Vein And Fingerprint Biometrics.	K2	
	CO3: Build the Privacy Enhancement and Multimodal Biometrics.	K3	
	CO4: Inspect analytical idea on Water marking Techniques.	K4	
	CO5: Assess knowledge on Future scope of Biometrics, and Study of various Biometric Techniques.	K5	

Learning Resources	
Text Books	1. Biometrics: Concepts and Applications by G.R Sinha and Sandeep B.Patil, Wiley, 2013.
Reference Books	1. Guide to Biometrics by Ruud M. Bolle , Sharath Pankanti, Nalini k.Ratha, Andrew W.Senior, Jonathan H.Connell, Springer 2009 . 2. Introduction to Biometrics by Anil k.Jain, Arun A.Ross, Karthik Nandakumar 3. Hand book of Biometrics by Anil K. Jain, Patrick Flynn, Arun A.Ross.
Website Link	1. https://www.tutorialspoint.com/biometrics/index.htm 2. https://www.javatpoint.com/biometrics-tutorial 3. https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/inspired/biometrics
Self-Study Material	1. https://mobidev.biz/blog/ai-biometrics-technology-authentication-verification-security

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS12	**BIOMETRICS**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	M	L	L	S	M	M	L
CO2	S	S	S	M	M	S	L	S	M	S
CO3	M	M	S	M	S	S	M	L	L	M
CO4	S	S	S	M	L	S	L	S	S	S
CO5	M	S	S	S	S	S	S	S	S	L

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS13	**CYBER FORENSICS**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students Learn the forensics fundamentals and apply the concepts of Duplication and Preservation of Digital Evidence.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Overview of Computer Forensics Technology:** **Computer Forensics Fundamentals:** What is Computer Forensics Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by Computer Forensics Specialists - Types of Computer. **Forensics Technology:** Types of Business Computer Forensic, Technology– Types of Military Computer Forensic Technology–Types of Law Enforcement– Computer Forensic. Technology–Types of Business Computer Forensic Technology.	K1	6
II	**Computer Forensics Evidence and capture:** Data Recovery: Data Recovery Defined, Data Back–up and Recovery, The Role of Back–up in Data Recovery, The Data –Recovery Solution. **Evidence Collection and Data Seizure:** Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collections, Artefacts, Collection Steps, Controlling Contamination: The chain of custody.	K2	6

III	**Duplication and Preservation of Digital Evidence:** Processing steps, Legal Aspects of collecting and Preserving Computer forensic Evidence. **Computer image Verification and Authentication:** Special needs of Evidential Authentication, Practical Consideration, Practical Implementation.	K3	6
IV	**Computer Forensics Analysis**: Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool. **Identification of Data:** Time Travel, Forensic Identification and Analysis of Technical Surveillance Devices.	K3	6
V	**Reconstructing Past Events:** How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. **Networks:** Network Forensics Scenario, a technical approach, Destruction Of E–Mail, Damaging Computer Evidence, Documenting The Intrusion on Destruction of Data, System Testing. ***Current Trends- Rise of Quantum Computing Threats in Forensics***	K4	6
	…… Self Study.		
Course Outcome	**CO1:** Learn the basic computer forensics fundamentals.	K1	
	CO2: Identify the different types of computer forensics technology.	K2	
	CO3: Apply the various computer forensics systems.	K3	
	CO4: Categorize the methods for data recovery, evidence collection and data seizure.	K3	
	CO5: Assess the knowledge of duplication and preservation of digital evidence.	K4	

Learning Resources				
Text Books	John R.Vacca — Computer Forensics: Computer Crime Investigation,3/E, Firewall Media, New Delhi, 2002.			
Reference Books	1. Nelson, Phillips Enfinger, Steuart,— Computer Forensics and Investigations Enfinger, Steuart, CENGAGE Learning,2004. 2. Anthony Sammes and Brian Jenkinson, Forensic Computing: A Practitioner&#39 Guide, Second Edition, Springer–Verlag London Limited,2007. 3. Robert M.Slade, Software Forensics Collecting Evidence from the Scene of a Digital Crime, TMH 2005.			
Website Link	https://www.hackingarticles.in/best-of-computer-forensics-tutorials/			
Self-Study Material	https://www.linkedin.com/pulse/opportunities-obstacles-quantum-cybersecurity-p-raquel-bise--eckze			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS13	**CYBER FORENSICS**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	S	S
CO2	M	M	M	S	S	L	M	S	M	S
CO3	S	S	M	S	S	S	M	S	S	S
CO4	S	S	S	M	S	M	M	S	M	S
CO5	M	S	S	S	S	M	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.K.Vijayakumar	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS14	**PATTERN RECOGNITION**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students learn the Pattern Recognition, various Statistical Pattern recognition techniques, linear discriminant functions and unsupervised learning and clustering.							

Unit	Course Content	Knowledge Levels	Sessions
I	**PATTERN RECOGNITION OVERVIEW** :Pattern Recognition, Classification and Description - Patterns and feature Extraction with Examples - Training and Learning in PR systems - Pattern recognition Approaches.	K1	6
II	**STATISTICAL PATTERN RECOGNITION**: Introduction to statistical Pattern Recognition supervised Learning using Parametric and Non Parametric Approaches.	K2	6
III	**LINEAR DISCRIMINANT FUNCTIONS AND UNSUPERVISED LEARNING AND CLUSTERING:** Introduction-Discrete and binary Classification Problems Techniques to directly Obtain linear Classifiers - Formulation of Unsupervised Learning Problems -Clustering From supervised learning and classification.	K2	6
IV	**SYNTACTIC PATTERN RECOGNITION** : Overview of Syntactic pattern Recognition-Syntactic recognition Via parsing and other grammars – Graphical Approaches to syntactic pattern recognition - Learning via grammatical inference.	K3	6
V	**NEURAL PATTERN RECOGNITION :** Introduction to Neural Networks - Feed - forward Networks and training by Back Propagation - Content Addressable Memory Approaches and Unsupervised Learning in Neural PR.***Current Trends - Statistical pattern recognition - Syntactic pattern recognition - Neural pattern recognition***	K4	6
	…… Self Study.		
	CO1: Recall the concepts of Pattern recognition Techniques.	K1	
	CO2: Illustrate the basic knowledge and Parametric and non-parametric related concepts.	K2	

Course Outcome	**CO3:** Build the Formulation of Unsupervised Learning Problems.	K3	
	CO4: Assume the Syntactic Pattern Recognition.	K3	
	CO5: Evaluate the concept of Neural Network models.	K4	

Learning Resources				
Text Book	Robert Schalkoff,- Pattern Recognition: Statistical Structural and NeuralApproaches, John Wiley & sons.			
Reference Book	EarlGose,Richard Johnson baugh,SteveJost,— Pattern Recognition and ImageAnalysis, Prentice Hall of India Pvt Ltd, NewDelhi.			
Website Link	https://www.simplilearn.com			
Self-Study Material	https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-pattern-recognition/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS14	**PATTERN RECOGNITION**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS15	**ENTERPRISE RESOURCE PLANNING**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students enhance business organizations by integrating key functions, facilitating growth, and enabling self-upgrade.							

Unit	Course Content	Knowledge Levels	Sessions
I	**ERP Introduction, Benefits, Origin, Evolution and Structure:** Conceptual Model of ERP, the Evolution of ERP, the Structure of ERP, Components and needs of ERP,ERP Vendors; Benefits & Limitations of ERP Packages.	K1	6
II	**Need to focus on Enterprise Integration/ERP Information mapping:** Role of common shared Enterprise data base; System Integration, Logical vs. Physical System Integration, Benefits & limitations of System Integration, ERP's Role in Logical and Physical Integration. Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing(OLAP), Product Life Cycle Management(PLM), LAP, Supply chain Management.	K2	6
III	**ERP Market place and Market place Dynamics:** Market Overview, Marketplace Dynamics, the Changing ERP Market. ERP Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications. Cloud and Open Source, Quality Management, Material Management, Financial Module, CRM and Case Study. Extensible markup language(XML)	K3	6

IV	**ERP Implementation Basics**: ERP implementation Strategy, ERP Implementation Life Cycle, PreImple mentation task, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.	K4	6
V	**ERP&E-Commerce**: Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP In to organizational culture. Using ERP tool: either SAP or ORACLE for mattocase study. Current Trends:*ERP tool *	K4	6
	***……* Self Study.**		
Course Outcome	**CO1:** Define the basic concepts of ERP	K1	
	CO2: Explain the different technologies used in ERP.	K2	
	CO3: Apply ERP methodology in modules such as inventory management, production planning.	K3	
	CO4: Discover the applications of ERP.	K4	
	CO5: Apply different tools used in ERP.	K4	

Learning Resources	
Text Books	Enterprise Resource Planning–Alexis Leon, Tata McGraw Hill.
Reference Books	Enterprise Resource Planning–Diversified by Alexis Leon, TMH. 2. Enterprise Resource Planning–Ravi Shankar & S. Jaiswal, Galgotia
Website Link	1.https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm 2.https://www.saponlinetutorials.com/what-is-erp-systems-enterprise-resource planning/ 3.https://www.guru99.com/erp-full-form.html 4.https://www.oracle.com/in/erp/what-is-erp/
Self-Study Material	1. https://www.techtarget.com/searcherp/feature/ERP-trends-for-this-year-and-beyond.

	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS15	**ENTERPRISE RESOURCE PLANNING**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS16	**ROBOTICS AND ITS APPLICATIONS**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students Learn the various drive systems of robots, sensors and their applications in robots and basic working concepts and types of robots.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics.	K1	8
II	**Actuators and sensors:** Types of actuators, stepper- DC – servo and brushless motors-model of a DC servo motor types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders tachometers straing auge based force to rquesens or proximity and distance measuring sensors Kinematics of robots: Representation of joints and frames, frames transformation, homogeneous matrix, DH matrix, Forward and inverse kinematics: two link planar (RR) and spherical robot (RRP). Mobile robot Kinematics: Differential wheel mobile robot	K2	8
III	**Localization:** Self-localizations and mapping - Challenges in localizations – IR based localizations – vision based Localizations–Ultrasonic based localizations -GPS localization systems.	K3	8
IV	**Path Planning:** Introduction, path planning-overview-road map path planning-cell decomposition path planning 6 214 potential field path planning-obstacle avoidance -case Studies**. Vision system:** Robotic vision systems image representation-object recognition-and categorization depth measurement- image data compression-visual inspection software considerations.	K4	8
V	**Application:** Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications- nuclear applications-space applications. ***Current Trends- Soft Robotics and Cognitive Robotics ***	K5	8

	***……* Self Study.**		
Course Outcome	**CO1:** Learn the different physical forms of robot architectures.	K1	
	CO2: Relate the Concept of Actuators and sensors.	K2	
	CO3: Identify the models of robot system.	K3	
	CO4: Evaluate he manipulation and navigation problems of AI in Robotics.	K4	
	CO5: Measure the performance of the Nuclear and Space Applications of Robotics.	K5	

Learning Resources				
Text Books	1. Richared D.Klafter. Thomas Achmielewski and Mickael Negin, Robotic Engineering and Integrated Approach, Prentice Hall India-Newdelhi-2001. 2. Saeed B.Nikku, Introduction to robotics, analysis, control and applications, WileyIndia, 2nd edition 2011.			
Reference Books	1. Industrial robotic technology-programming and application by M.P.Groover et.al, McGraw hill 2008. 2. Robotics technology and flexible automation by S.R.Deb, THH-2009			
Website Link	1.https://www.javatpoint.com/robotics-tutorial			
Self-Study Material	1.https://www.elveflow.com/microfluidic-reviews/general-microfluidics/soft-robot/ https://neura-robotics.com/cognitive-robots-the-new-era-of-true-collaboration			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS16	**ROBOTICS AND ITS APPLICATIONS**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS17	**SIMULATION AND MODELLING**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Students Learn simulation requirements, utilize diverse tools, focus on creating software environments.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction To Modeling & Simulation:** What is Modeling and Simulation – Complexity Types – Model Types – Simulation Types – M&S Terms and Definitions Input Data Analysis – Simulation Input Modeling – Input Data Collection - Data Collection Problems - – Input Modeling Strategy - Histograms –Probability Distributions - Selecting a Probability Distribution.	K1	6
II	Random Variate Generation Random Numbers – Random Number Generators – General principles – Inverse Transform Method –Acceptance Rejection Method – Composition Method –Relocate and Rescale Method - Specific distributions-Output Data Analysis – Introduction -Types of Simulation With Respect to Output Analysis - Stochastic Process and Sample Path - Sampling and Systematic Errors - Mean, Standard Deviation and Confidence Interval - Analysis of Finite- Horizon Simulations - Single Run - Independent Replications - Sequential Estimation – Analysis of Steady-State Simulations - Removal of Initialization Bias (Warm-up Interval) - Replication-Deletion Approach - Batch-Means Method .	K2	6
III	**Comparing Systems via Simulation:** Introduction – Comparison Problems - Comparing Two Systems - Screening Problems - Selecting the Best - Comparison with a Standard - Comparison with a Fixed Performance Discrete Event Simulations – Introduction - Next-Event Time Advance - Arithmetic and Logical Relationships - Discrete-Event Modeling Approaches – Event- Scheduling Approach – Process Interaction Approach.	K3	6
IV	**Entity Modeling:** Entity Body Modeling – Entity Body Visualization – Entity Body Animation – Entity Interaction Modeling – Building Modeling Distributed Simulation – High Level Architecture (HLA) – Federation Development and Execution Process (FEDEP) – SISO RPR FOM Behavior Modeling – General AI Algorithms - Decision Trees Neural	K4	6

	Networks - Finite State Machines - Logic Programming - Production Systems – Path Planning - Off-Line Path Planning - Incremental Path Planning - Real-Time Path Planning – Script Programming -Script Parsing – Script Execution.		
V	**Algorithms:** Optimization Algorithms – Genetic Algorithms – Simulated Annealing Examples: Sensor Systems Modeling – Human Eye Modeling – Optical Sensor Modeling – Radar Modeling. ***Current Trends- Additive Manufacturing and Generative Design*.**	K5	6
	…… Self Study.		
Course Outcome	**CO1:** Recall modeling and simulation concepts, analyze input data, and model.	K1	
	CO2: Understand random variants and number generation, analyze simulations and methods.	K2	
	CO3: Analyze systems by comparing them through simulation.	K4	
	CO4: Compare the Entity Body Modeling, Visualization, Animation.	K4	
	CO5: Evaluate the Algorithms and Sensor Modeling.	K5	

Learning Resources				
Text Books	1. Jerry Banks, John Wiley& Sons, Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice‖, Inc., 1998. 2. George S.Fishman, Discrete-Event Simulation: Modeling, Programming and Analysis, Springer- Verlag NewYork, Inc.,2001.			
Reference Books	1. Andrew F.Seila, VlatkoCeric, Pandu Tadikamalla,"Applied Simulation Modeling" ThomsonLearningInc.,2003.			
Website Link	1. https://www.tutorialspoint.com/modelling_and_simulation/index.htm 2. https://www.javatpoint.com/verilog-simulation-basics			
Self-Study Material	https://www.designnews.com/design-software/five-trends-that-will-define-simulation-and-test-in-2023			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAS17	**SIMULATION AND MODELLING**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	M	S
CO2	M	M	M	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.E.Natarajan	**HoD - Mr.G.Selvakumar**	**Member Secretary Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS18	**ORGANIZATION BEHAVIOR**	**SEC THEORY**		**2**	**2**			**2**
Objective	Students extensive knowledge on OB and the scope of OB.							

Unit	Course Content	Knowledge Levels	Sessions
I	**INTRODUCTION :** Concept of Organizational Behavior (OB): Nature - Scope and Role of OB: Disciplines that contribute to OB; Opportunities for OB (Globalization, Indian workforce diversity, customer service - innovation and change,-networked organizations - work-life balance - people skills - positive work environment, ethics)	K1	6
II	**INDIVIDUAL BEHAVIOUR:** Learning, attitude and Job satisfaction: Concept of learning -conditioning - shaping and reinforcement. Concept of attitude - components - behavior and attitude. Job satisfaction: causation; impact of satisfied employees on workplace. **Motivation :** Concept - Theories (Hierarchy of needs - X and Y - Two factor – McClelland - Goal setting - Self- efficacy - Equity theory) - Job characteristics model; Redesigning jobs - Personality and Values : Concept of personality - Myers- Briggs Type Indicator (MBTI) - Big Five model. Relevance of values; Linking personality and values to the workplace (person-job fit, person-organization fit)Perception, Decision Making : Perception and Judgments – Factors - Linking perception to individual decision making	K2	6
III	**GROUP BEHAVIOUR :** 1. Groups and Work Teams : Concept - Five Stage model of group development - Group norms, cohesiveness - Group think and shift - Teams - types of teams - Creating team players from individuals and team based work(TBW) 2. Leadership : Concept -Trait theories - Behavioral theories (Ohio and Michigan studies) - Contingency theories (Fiedler - Hersey and Blanchard - Path-Goal);	K3	6
IV	**ORGANISATIONAL CULTURE AND STRUCTURE :** Concept of culture; Impact (functions and liability) - Creating and sustaining culture - Concept of structure - Prevalent organizational designs - New design options	K4	6

V	**ORGANISATIONAL CHANGE, CONFLICT AND POWER:** Forces of change - Planned change; Resistance - Approaches (Lewin's model, Organizational development) - Concept of conflict, Conflict process - Types, Functional/ Dysfunctional. Introduction to power and politics. ***Current Trends-Lack of employee engagement ***	K5	6
	…… Self Study.		
Course Outcome	CO1: Define Organizational behavior, Understand the opportunity through OB.	K1	
	CO2: Apply self-awareness, motivation, leadership and learning Theories at workplace.	K2	
	CO3: Analyze the complexities and solutions of group behaviour.	K3	
	CO4: Impact and bring positive change in the culture of the organization.	K4	
	CO5: Create a congenial climate in the organization	K5	

Learning Resources				
Text Books	1. NeharikaVohra Stephen P. Robbins, Timothy A. Judge , Organizational Behaviour, Pearson Education, 18th Edition, 2022. 2. red Luthans, Organizational Behaviour, Tata McGraw Hill, 2017. Ray French, Charlotte Rayner, Gary Rees & Sally Rumbles, Organizational Behaviour, John Wiley & Sons, 2011 3. Louis Bevoc, Allison Shearsett, Rachael Collinson, Organizational Behaviour Reference, Nutri Niche System LLC (28 April 2017). 4. Dr. Christopher P. Neck, Jeffery D. Houghton and Emma L. Murray, Organizational Behaviour: A Skill-Building Approach, SAGE Publications, Inc; 2nd edition (29 November 2018).			
Reference Books	1 .Uma Sekaran, Organizational Behaviour Text & cases, 2nd edition, Tata McGraw Hill Publishing CO. Ltd. 2. GangadharRao, Narayana, V.S.P Rao, Organizational Behaviour 1987, Reprint 2000, Konark Publishers Pvt. Ltd, 1st edition. 3. S.S. Khanka, Organizational Behaviour, S. Chand & Co, New Delhi. J. Jayasankar, Organizational Behaviour, Margham Publications, Chennai, 2017.			
Website Link	ps://psychopedia.in/trends-in-organizational-behavior/			
Self-Study Material	ps://www.researchgate.net/publication/358356661_New_Trends_in_Organizational_Behavior			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS18	**ORGANIZATION BEHAVIOR**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr. V. Vengadesh	**HoD - Mr.G.Selvakumar**	**Member Secretary Dr.S.Shahitha**

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS19	**UNDERSTANDING INTERNET**	**SEC THEORY**		**2**	**2**	**-**	**-**	**2**
Objective	Student Learn the basic concepts of internet, features of internet technology, and cybercrime is crucial for navigating the digital landscape.							

Unit	Course Content	Knowledge Levels	Sessions
I	Emergence of the internet as a mass medium –World of world wide web.	K1	6
II	Features of the internet as a technology.	K2	6
III	Internet as a source of infotainment- classification based on content and style.	K3	6
IV	Demographic and psychographic descriptions of internet audiences – Effect of internet on the values and life-styles.	K3	6
V	Present issues such as cybercrime and future possibilities. ***Current Trends -Smart Spaces.***	K4	6
	…… Self Study.		
Course Outcome	**CO1:** Recall the foundational principles of the internet, and concepts.	K1	
	CO2: Employ the principles of Internet technology to effectively utilize current techniques.	K2	
	CO3: Apply infotainment based on its content and style, by enhancing internet technology.	K3	
	CO4: Categorize information regarding demographic and psychographic descriptions of internet users.	K3	
	CO5: Assess complexities of cybercrime while considering future possibilities.	K4	

Learning Resources				
Text Books	1. Harley Hahn, “The Internet Complete Reference”, 2nd Edition, Tata McGraw-Hill. 2. Alexis Leon, Mathews Leon, “Internet for Everyone”, Tata McGraw-Hill. 3. Srivastava, KM “Media Issues”, Sterling Publishers Pvt Ltd, 1992.			
Reference Books	1. P.J. Deitel, H.M.Deitel “Internet & World Wide Web How to Program”, 4th Edition, Prentice Hall, 2008.			
Website Link	1.https://www.jagranjosh.com/general-knowledge/internet-and-its-features-1644302980-2. 2.https://www.geeksforgeeks.org/what-is-internet-definition-uses-working-advantages-and-disadvantages/			
Self-Study Material	1. https://valoremreply.com/post/smart-spaces-iot-and-beyond/ 2. https://www.cognizant.com/us/en/glossary/smart-spaces			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Title	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAS19	**UNDERSTANDING INTERNET**			**SEC THEORY**			**2**	**2**	**-**	**-**	**2**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	M	M	S	S	L	L	M	S
CO2	M	L	L	M	M	M	M	M	S	M
CO3	S	S	L	S	S	S	M	L	M	S
CO4	S	M	M	M	M	S	S	M	S	M
CO5	M	S	S	L	S	M	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.V.Krishnaveni	**HoD – Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

List of Non Major Elective Course (NMEC) offered by the B.C.A.,
LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards
LIST OF NMEC COURSES

S.No	SEM	COURSE_CODE	TITLE OF THE COURSE
1		23M_UCAN01	FUNDAMENTALS OF INFORMATION TECHNOLOGY
2		23M_UCAN02	INTRODUCTION TO HTML

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M_UCAN01	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	**NMEC – I**		**2**	**2**	**-**	**-**	**2**
Objective	Students Learn the basic concepts and terminology of information technology.							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction to Computers - Generations of Computer – Data and Information – Components of Computer – Software – Hardware – Input Devices - Output Devices –– Types of Operating System.	K1	6
II	MS Word: Introduction – Elements of Window – Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment - Bullets and Numbering - Header and footer watermark – inserting objects (images, other application document) – Table creation – Mail merge.	K2	6
III	Ms Excel: Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.	K3	6
IV	MS PowerPoint: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).	K3	6
V	Internet: Introduction to Internet and Intranet – Services of Internet -Domain Name – URL – Browser – Types of Browsers – Search Engine -E-Mail – Basic Components of E-Mail –.How to send group mail. E Commerce: Digital Signature – Digital Currency – Online shopping and transaction.	K4	6

Course Outcome	**CO1:** Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	K1
	CO2: Illustrate organizational structure using for the devices present currently under input or output unit.	K2
	CO3: Apply the concept of storing data in computer using two headers namely RAM and ROM.	K4
	CO4: Demonstrate different software and its applications.	K3
	CO5: Design the system software which really acts as an interpreter between software and hardware.	K4

Learning Resources	
Text Books	1. Anoop Mathew, S. KavithaMurugeshan (2009), — Fundamental of Information Technology‖, Majestic Books. 2. Alexis Leon, Mathews Leon,‖ Fundamental of Information Technology‖, 2nd Edition. 3. S. K Bansal, —Fundamental of Information Technology‖.
Reference Books	1.BhardwajSushilPuneet Kumar, —Fundamental of Information Technology‖ 2. GG WILKINSON, —Fundamentals of Information Technology‖, Wiley-Blackwell 3. A Ravichandran, —Fundamentals of Information Technology‖, Khanna Book Publishing.
Website Link	https://testbook.com/learn/computer-fundamentals https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html https://www.javatpoint.com/computer-fundamentals-tutorial https://www.tutorialspoint.com/computer_fundamentals/index.htm https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf.

L-Lecture	**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAN01	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	**NMEC – I**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	M	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	M	M	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.N.Padmavathi **Mr.K.Vijayakumar**	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

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BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
23M_UCAN02	INTRODUCTION TO HTML	NMEC- II		2	2	-	-	2

Objective	Students Learn the Concepts of ordered and unordered lists within a web page and Create a web page.

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction: Web Basics: What is Internet – Web browsers – What is Webpage – HTML Basics: Understanding tags.	K1	6
II	Tags for Document structure (HTML, Head, Body Tag). Block level text elements: Headings paragraph (<p> tag).Font style elements: (bold, italic, font, small, strong, strike, big tags).	K2	6
III	Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR Using Images – Creating Hyperlinks.	K3	6
IV	Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan –Cell padding.	K3	6
V	Frames: Frameset – Targeted Links – No frame. Forms: Input, Text area, Select, Option.	K4	6
Course Outcome	**CO1:** Recall the basic concept in HTML and Concept of resources in HTML.	**K1**	
	CO2: Identify the Concept of Meta Data, Understand the concept of save the files.	**K2**	
	CO3: Analyse the page formatting and Concept of list.	**K3**	
	CO4: Apply Links and Know the concept of creating link to email address.	**K3**	
	CO5: Design the Concept of adding images and Understand the table creation.	**K4**	

Learning Resources				
Text Books	"Mastering HTML5 and CSS3 Made Easy", TeachUComp Inc., 2014.			
Reference Books	Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”			
Website Link	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf https://www.w3schools.com/html/default.asp			
L-Lecture		**T-Tutorial**	**P-Practical**	**C-Credit**

BCA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M_UCAN02	**INTRODUCTION TO HTML**	**NMEC- II**		**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	M	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	M	M	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mrs.N.Padmavathi **Mr.K.Vijayakumar**	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

Allied Course for any Degree offered by the B.C.A.,
LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards
LIST OF GEC - ALLIED COURSES

S.No.	Sem	COURSE_CODE	TITLE OF THE COURSE
1	III	23M3UCMA02	E-Commerce
2	VI	23M6UCME02	Computer Application in Business
3	I	23M1UCCA01	Programming in C
4	I	23M1UCCA02	Python Programming
5	II	23M2UCCA01	Programming in C++
6	II	23M2UCCA02	Office Automation
7	III	23M3UCCA03	Web Technology(PHP) and Lab
8	III	23M3UCCA04	Programming in JAVA and Lab
9	IV	23M4UCCA04	Relational Database Management System
10	IV	23M4UCCA05	Introduction to Data Science
11	V	23M5UCCA05	Software Engineering and UML Lab
12	V	23M5UCCA06	Object Oriented Analysis and Design and UML Lab
13	VI	23M6UCCA06	R Language
14	IV	23M4UPAA02	R Programming
15	V	23M5UPAA03	Python Programming

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B.Com Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCMA02	**E-COMMERCE**	**GEC THEORY**	**III**	**4**	**2**	**2**	**-**	**3**
Objective	Students Learn the Electronic commerce, various Business models the internet marketing technologies, benefits and implementation of EDI.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to E-Commerce** Defining E - Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce - Process of E-Commerce - Types of ECommerce; The World Wide Web, The Internet and the Web: Features, Role of Automation & Artificial Intelligence in ECommerce.	K1	10
II	**E-Commerce Business Models & Consumer Oriented E Commerce** E-commerce Business Models, Major Business to Consumer (B2C) Business Models, Major Business to Business (B2B) Business Models, Business Models in Emerging E-Commerce Areas - E-tailing: Traditional Retailing and E- retailing, Benefits of E-retailing, Models of E-retailing, Features of E-retailing.	K2	10
III	**E-Commerce Marketing Concepts** The Internet Audience and Consumer Behaviour, Basic Marketing Concepts, Internet Marketing Technologies – Marketing Strategy - E services: Categories of E-services, WebEnabled Services, Information-Selling on the Web.	K3	10
IV	**Electronic Data Interchange & Security** Benefits of EDI, EDI Technology, EDI Standards, EDI Communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System - Digital Economy - Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web Server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server.	K4	10

V	**Ethics in E-Commerce** Issues in E Commerce Understanding Ethical, Social and Political Issues in E-Commerce: A Model for Organizing the Issues, Basic Ethical Concepts, Analysing Ethical Dilemmas, Candidate Ethical Principles Privacy and Information Rights: Information Collected at E-Commerce Websites. ***Current Trends: Social and Political Issues in E-Commerce***	K5	10
	***……* Self Study.**		
Course Outcome	**CO1:**Recall the role and features of world wide web	K1	
	CO2: Understand the Benefits and model of e-tailing	K2	
	CO3: Demonstrate Web-enabled services utilize online platforms to deliver various services to users.	K3	
	CO4: Implementing comprehensive cyber security measures .	K4	
	CO5: Evaluate the ethical principles Privacy and Information Rights.	K5	

Learning Resources	
Text Books	1. Kenneth C. Laudon, E-Commerce Business Technology Society, 4 the Edition, Pearson Education Limited, New Delhi. 2 .S. J. Joseph, E-Commerce: an Indian perspective, PHI Learning Pvt. Ltd., New Delhi 3 .David Whitley, E-Commerce-Strategy, Technologies & Applications, TMI, McGraw-Hill, London. 4 .Kamlesh K. Bajaj, E-Commerce- The cutting edge of business, TMH, McGraw Hill, Noida. 5 . W Clarke, E-Commerce through ASP - BPB, Wrox Publisher, Mumbai .
Reference Books	1.Agarwala, K.N. and D. Agarwala, Business on the Net : What's and How's of E-Commerce, McMillan Publisher India Pvt. Ltd., Chennai. 2 Ravi Kalkota, Frontiers of E-Commerce, TM, Pearson Education Limited, New Delhi. 3 Elias M Awad, Electronic Commerce From Vision to Fulfillment. PHI Learning Pvt. Ltd., New Delhi. 4 Mathew Reynolds, Beginning E-Commerce with Visual Basic, ASP, SQL Server 7.0 & MTS, Wrox Publishers, Mumbai. 5 J. Christopher West I and Theodore H. K Clark Global Electronic CommerceTheory and Case Studies, The MIT Press, Cambridge, London.
Website Link	1. https://www.investopedia.com/terms/e/ecommerce.asp 2. https://www.webfx.com/industries/retail-ecommerce/ecommerce/basic ecommerce-marketing-concepts/ 3. https://techbullion.com/the-importance-of-ethics-in-ecommerce/
Self-Study Material	https://indiafreenotes.com/understanding-ethical-social-and-political-issues-in-e-commerce-a-model-for-organizing-the-issues-basic/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Com Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M3UCMA02	**E-COMMERCE**	**GEC THEORY**	**III**	**4**	**2**	**2**	**-**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.R.Suguna	**HOD – Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
RASIPURAM - 637408.

B. Com Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCME02	**COMPUTER APPLICATION IN BUSINESS**	**GEC THEORY**	**VI**	**5**	**2**	**3**	**-**	**3**
Objective	Students Apply various terminologies used in the operation of computer systems in a businessenvironment.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Word Processing**: Introduction to Word-Processing, Word-Processing Concepts, Use of Templates, and Working with Word Document: Editing Text, Find and Replace Text, Formatting, Spell Check, Autocorrect, Auto Text - Bullets and Numbering, Tabs, Paragraph Formatting, Indent, and Page Formatting, Header and Footer.	K1	12
II	**Mail Merge**: Tables - Inserting, Filling and Formatting a Table- Inserting Pictures and Video - Mail Merge Including Linking with Database - Printing Documents, Creating Business Documents.	K2	12
III	**Preparing Presentations**: Basics of Presentations: Slides, Fonts, Drawing, Editing, Inserting, Tables, Images, texts, Symbols. Media – Design – Transition – Animation - Slideshow. Creating Business Presentations.	K3	12
IV	**Spreadsheet and its Business Applications Spreadsheet:** Concepts, Managing Worksheets - Formatting, Entering Data, Editing, and Printing a Worksheet - Handling Operators in Formula, Project Involving Multiple Spreadsheets, Organizing Charts and Graphs. Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and Reference, Database, and Text Functions.	K4	12
V	**Creating Business Spreadsheet**: Creating Spreadsheet in the Area of: Loan and Lease Statement, Ratio Analysis, Payroll Statements, Capital Budgeting, Depreciation Accounting, Graphical Representation of Data, Frequency Distribution and its Statistical Parameters, Correlation and Regression. ***Current Trends- Excel for Windows***	K5	12
	***……* Self Study.**		

Course Outcome	**CO1:** Recall the various working techniques in MS-WORD.	K1	
	CO2: Summarize appropriate business document send to more persons at a time.	K2	
	CO3: Build the Presentation for Seminars and Lecture.	K3	
	CO4: List various tools used in MS-EXCEL.	K4	
	CO5: Select Excel tools in various business areas of Finance, HR, and Statistics.	K5	

Learning Resources				
Text Books	1. R Parameswaran, Computer Application in Business – S, Chand Publishing, UP. 2. Dr. Sandeep Srivastava, Er. Meera Goyal, Computer Applications In Business, SBPD Publications, UP. 3. Mansi Bansal, Sushil Kumar Sharma, Computer Application In Business, Mumbai, Maharashtra. 4. Peter Norton, Introduction to Computers, Tata McGraw-Hill, Noida. 5. Renu Gupta, Computer Applications in Business, Shree Mahavir Book Depot (Publishers) New Delhi.			
Reference Books	1.Gupta, Swati, Office Automation System, Lap Lambert Academic Publication.USA. 2.Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, Microsoft 2003, Tata McGraw Hill, Noida. 3. Dr.R.Deepalakshmi,Computer Fundamentals and Office Automation, Charulatha Publications, Tamilnadu. 4. John Walkenbach, MS Excel 2007 Bible, Wiley Publication, New Jersey, USA. 5.Glyn Davis & BrankoPecar, Business Statistics using Excel, Oxford Publication, Chennai.			
WebsiteLink	1. https://www.udemy.com/course/office-automation-certificate-course/			
Self-Study Material	https://techcommunity.microsoft.com/t5/excel-blog/what-s-new-in-excel-october- 2023/ba-p/3945988			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B. Com Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCME02	**COMPUTER APPLICATION IN BUSINESS**	**GEC THEORY**	**VI**	**5**	**2**	**3**	**-**	**3**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	S	S	M	M	S	S
CO2	S	M	S	M	M	S	M	S	M	S
CO3	S	S	S	M	S	S	M	M	S	S
CO4	S	M	S	M	M	S	M	M	M	S
CO5	S	S	S	M	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.M.Purusothaman	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCCA01	PROGRAMMING IN C	GEC THEORY	I	4	2	-	2	3

Objective	To Understand the basic concepts of C language, Decision statements, Loop concepts and Evaluate the performance of Arrays, Functions & Pointers in C.

S.No.	Course Content	Knowledge Levels	Sessions
I	**Introduction to C Language**: C Language Introduction -Features of C Language - Benefits of C over other languages - Compilation of C Program - First Program in C Pre-processor directives.	K1	9
II	**Variables, Data Types & Operators**: Variables and Keywords in C-Scope rules in C-Data Types in C-Operators & Its Types-Typecasting in C.	K2	9
III	**Control Flow Statements**: Decision Making Statements-Switch Statement in C-C Loops & Control Structure Practice problems-Continue Statement, Break Statement. Array & String Handling in C:Arrays in C-Multidimensional Arrays in C - Strings in C - String functions in C.	K3	11
IV	**Functions in C**: Function Prototype-Parameter Passing Techniques in C-Storage Classes in C-Recursion Concept -Functions in C Practice problems.	K4	7
V	**Pointers, Structures, and Unions**: Pointers in C-Structures- Union - Enumeration (or enum) in C-Pointer vs Array in C – C application programs (Sorting, Matrix manipulations, student's mark list preparation).	K4	9
Course Outcome	**CO1: To Discuss about the concepts of Control Structures.**	**K1**	
	CO2: To Illustrate the concept of single and multi-dimensional arrays.	**K2**	
	CO3: To Apply the concept of Strings for writing programs related to character array.	**K3**	
	CO4: To Differentiate programs using concept of user defined and recursive functions.	**K4**	
	CO5: To Design the concept of structures to develop the programs using C.	**K4**	

	List of Programs: 1.Write a C program to find roots of a Quadratic equation. 2. Write a C program to find the total no. of digits and the sum of individual digits of a positive integer. 3. Write a C program to generate the Fibonacci sequence of first N numbers. 4. Write a C program to sum the series S=1 – x + (x^2/2!) - (x^3/3!) + ---- - (x^n/n!) 5. Write a C program to arrange the elements of an integer array using Bubble Sort algorithm. 6. Write a C program to input two matrices and perform matrix multiplication on them 7.Write a C program to check whether the given string is palindrome or not without using Library functions. 8. Write a C program to count the number of lines, words and characters in a given text. 9. Write a C program to generate Prime numbers in a given range using user defined function. 10. Write a C program to find factorial of a given number using recursive function. 11. Write a C program to maintain a record of n student details using an array of structures with four fields - Roll number, Name, Marks and Grade. Calculate the Grade according to the following conditions. Marks Grade >=80 A >=60 B >=50 C >=40 D <40 E Print the details of the student, given the student Roll number as input.			

Learning Resources	
Text Books	1. E. Balaguruswamy, “Programming in ANSI C”, 8th Edition, 2019, McGraw Hill Education, ISBN:978-93-5316-513-0. 2. Pradip Dey, Manas Ghosh, “Programming in C”, 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6. 3. Kernighan B.W and Dennis M. Ritchie, “The C Programming Language”, 2nd
Reference Books	1. Yashavant P. Kanetkar, “Let Us C”, 16th Edition, 2019, BPB Publications, ISBN: 978- 93-8728-449-4. 2. Jacqueline A Jones and Keith Harrow, “Problem Solving with C”, Pearson Education. ISBN: 978-93-325-3800-9.
Website Link	1.http://www.learn-c.org/ 2.http://crasseux.com/books/ctutorial/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M1UCCA01	**PROGRAMMING IN C**	**GEC THEORY**	**I**	**4**	**2**	**-**	**2**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mrs.N.Padmapriya	**HOD - Dr.V.Vijayadeepa**	**Member Secretary –Dr.S.Shahitha**

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B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCCA02	**PYTHON PROGRAMMING**	**GEC THEORY**	**I**	**4**	**2**	**-**	**2**	**3**
Objective	Students Learn the basic concepts of strings, functions and process of structuring the data using lists, dictionaries, tuples and sets.							

S.No	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Computer algorithms - Computer Hardware Computer Software - Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output.	K1	10
II	**Control Structures:** Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs - Understanding and using ranges.	K2	10
III	**Functions:** Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions.	K3	10
IV	**Objects and their use:** Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules.	K4	10
V	**Dictionaries and Sets:** Dictionary type in Python - Set Data type. Text Files: Opening, reading and writing text files – Exception Handling Total. ***Current Trends - Matplotlib: Visualization with Python*.**	K4	10

Course Outcome	**CO1:** Discuss about the Basic concepts of Python Programming.	**K1**	
	CO2: Illustrate the concept of Conditional and Looping Statements.	**K2**	
	CO3: Apply the concept of Functions.	**K3**	
	CO4: Demonstrate the Concept of Python Modules.	**K4**	
	CO5: Evaluate the Concept of Dictionaries and Sets.	**K4**	
	List of Programs: 1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice. 2. Write a Python program to construct the following pattern, using a nested loop * ** *** **** ***** **** *** ** * 3. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria: Grade A: Percentage >=80 Grade B: Percentage >=70 and 80 Grade C: Percentage >=60 and =40 and < 40 4. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user. 5. Write a Python script that prints prime numbers less than 20. 6. Program to find factorial of the given number using recursive function. 7. Write a Python program to count the number of even and odd numbers from array of N numbers. 8. Write a Python class to reverse a string word by word. 9. Read a file content and copy only the contents at odd lines into a new file. 10. Create a Turtle graphics window with specific size.		

Learning Resources				
Text Books	1. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem-solving Focus”, Wiley India Edition, 2015. 2. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016.			
Reference Books	1. John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410. 2. Michel Dawson, “Python Programming for Absolute Beginers” , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009.			
Self Study link	https://matplotlib.org/			
Website Link	https://www.w3schools.com/python/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M1UCCA02	**PYTHON PROGRAMMING**	**GEC THEORY**	**I**	**4**	**2**	**-**	**2**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz Program, Model Preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.N.Padmapriya	**HoD - Dr.V.Vijayadeepa**	**Member Secretary – Dr.S.Shahitha**

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B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCCA01	PROGRAMMING IN C++	GEC THEORY	II	4	2	-	2	3
Objective	Students impart knowledge of the C++ language grammar in order to design and implement programming solutions to simple problems by applying Object Oriented thinking.							

S.No.	Course Content	Knowledge Levels	Sessions
I	**Object Oriented Programming Concepts:** Complexity in software - The need for object-orientation – Abstraction – Encapsulation – Modularity – Hierarchy. **Basic Elements of C++:** Classes – Objects – Data members and member functions – private and public access specifiers - Static members - Constructors – Singleton class – Destructors.	K1	11
II	**Friend Functions and Friend Classes** - Array of objects – Pointer to objects - this pointer – References – Dynamic memory allocation - Namespaces. **Function Overloading:** Overloading a function - Default arguments – Overloading Constructors. **Operator Overloading:** Overloading an operator as a member function – Overloading an operator as a friend function.	K2	11
III	**Overloading** : Overloading the operators [], (), -> and comma operators – Conversion Functions. **Inheritance**: Types of inheritance – protected access specifier – Virtual Base Class – Base class and derived class constructors. **Run-time Polymorphism**: Virtual Functions.	K3	10
IV	Function overriding - Pure virtual function – Abstract base class. **Templates:** Function templates – Overloading a function template – Class templates.	K4	8

V	**Exception Handling**: Exceptions – try, catch, throw – Rethrowing an exception – Restricting exceptions - Handling exceptions in derived classes - terminate(), abort(), unexpected(), set_terminate(). **I/O Streams**: Formatted I/O with ios class functions - Manipulators – Creating own manipulator – Overloading << and >> operators. ***Current Trends: AI and Machine Learning***	K5	10
	Self Study		
	1. Write a class to represent a complex number which has member functions to do the following a. Set and show the value of the complex number b. Add, subtract and multiply two complex numbers c. Multiplying the complex number with a scalar value 2. Write a Point class that represents a 2-d point in a plane. Write member functions to a. Set and show the value of a point b. Find the distance between two points c. Check whether two points are equal or not 3. Design and implement a class to represent a Solid object. a. Apart from data members to represent dimensions, use a data member to specify the type of solid. b. Use functions to calculate volume and surface area for different solids. 4. Design a class representing time in hh:mm:ss. Write functions to a. Set and show the time b. Find the difference between two time objects c. Adding a given duration to a time d. Conversion of the time object to seconds 5. Design a 3x3 matrix class and demonstrate the following: a. Addition and multiplication of two matrices using operator overloading b. Maintaining a count of the number of matrix object created 6. Design a class called cString to represent a string data type. Create a data member in the class to represent a string using an array of size 100. Write the following functionality as member functions: a. Copy Constructor b. Concatenate two strings		

	c. Find the length of the string d. Reversing a string e. Comparing two strings 7. Design a class called cString to represent a string data type. Create a data member in the class to represent a string whose size is dynamically allocated. Write the following as member functions: a. Copy Constructor b. Destructor c. Concatenate two strings d. Find the length of the string e. Reversing a string f. Comparing two strings		
Course Outcome	**CO1:** Recall the basic concepts of Object-orientation.	**K1**	
	CO2: Construct a programs to implement static binding.	**K2**	
	CO3: Analyze the concepts of inheritance and dynamic binding.	**K3**	
	CO4: Implement the templates and exception handling and learn how to use STL class library.	**K4**	
	CO5: Evaluate the concepts of File and Stream I/O.	**K5**	

Learning Resources	
Text Books	1. Herbert Schildt, C++ - The Complete Reference, Third Edition, TMH, 1999. 2. Grady Booch, Object Oriented Analysis and Design, Pearson Education, 2008.
Reference Books	1. Bjarne Strousstrup, The C++ Programming Language, Addison Wesley, 2000. 2. J. P. Cohoon and J. W. Davidson, C++ Program Design – An Introduction to Programming and Object-Oriented Design, Second Edition, McGraw Hill, 1999. 3. C. J. Lippman, C++ Primer, Third Edition, Addison Wesley, 2000.
Website Link	1. https://www.tutorialspoint.com/cplusplus/index.htm 2. https://www.geeksforgeeks.org/c-plus-plus/
Self Study Link	1. https://fchiaramonte.com/artificial-intelligence-with-c/#:~:text=AI%20in%20C%2B%2B%20involves%20the,to%20complex%20artificial%20neural%20networks.

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M2UCCA01	**PROGRAMMING IN C++**	**GEC THEORY**	**II**	**4**	**2**	**-**	**2**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz Program, Model Preparation
Teaching and Learning Methods	Audio Video Lecture, Chalk and Board Class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA – I , CIA – II and ESC

Designed By	Verified By	Approved By
Mrs.N.Padmapriya	**HoD - Dr.V.Vijayadeepa**	**Member Secretary – Dr.S.Shahitha**

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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCCA02	OFFICE AUTOMATION	GEC THEORY - II	II	4	2	-	2	3

Objective	To Impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point and acquire knowledge on editor, spread sheet and presentation software.

S.No.	Course Content	Knowledge Levels	Sessions
I	**Introductory concepts**: Hardware and Software - Memory unit – CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems - Introduction to Programming Languages.	K1	9
II	**Word Processing**: File menu operations - Editing text – tools, formatting, bullets and numbering - Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, printing – Preview, options, merge.	K2	9
III	**Spreadsheets:** Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying.	K3	11
IV	**Charts** – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.	K4	7
V	**Power point**: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.	K4	9
Course Outcome	**CO1:** To Discuss about the basic concepts of computer systems and its components.	**K1**	
	CO2: To Identify the concepts of a word processing package.	**K2**	
	CO3: To Apply the basic concepts of electronic spreadsheet and its calculations.	**K3**	
	CO4: To Analyze the concepts of database management system and its queries.	**K4**	
	CO5: To Design a presentation using PowerPoint tool with animation effects.	**K4**	

List of Programs:-

Word:

Task 1 : Using word to create project certificate. Features to be covered:-Formatting Fonts, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Task 2 : Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes.

Task 3 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

Excel:

Task1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Task 2 : Calculations - Features to be covered:- Cell Referencing, Formulae in excel – average, standard deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3 : Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

MS Power Point:

Task1 :Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered includes :- PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows.

Task 2 : This session helps students in making their presentations interactive. Topics covered includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3 : Concentrating on the in and out of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topics covered includes :- Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.Auto content wizard, Slide Transition, Custom Animation, Auto Rehearsing .

LEARNING RESOURCES				
Text Book	1. Peter Norton, “Introduction to Computers” –Tata McGraw-Hill.			
Reference Book	1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw- Hill.			
Website Link	Web content from NDL / SWAYAM or open source web resources.			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M2UCCA02	OFFICE AUTOMATION	GEC THEORY - II	II	4	2	-	2	3	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S	L	M	S	S	S
CO2	M	S	S	S	S	L	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	S	S	S	S
CO5	M	S	S	L	L	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assessment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By
Mrs.N.Padmapriya	HoD - Dr.V.Vijayadeepa	Member Secretary – Dr.S.Shahitha

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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCCA03	**WEB TECHNOLOGY(PHP)**	**GEC THEORY**	**III**	**4**	**2**	**-**	**2**	**3**

Objective	Students Learn the basics of PHP and MySQL and develop dynamic websites for user on the Internet, develop websites ranging from simple online information forms to complex e-commerce sites with MySQL database, building, connectivity, and maintenance.		
Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	**Introduction of PHP:** Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.	K1	10
II	**Controlling Program Flow:** Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.	K2	10
III	**Working with Arrays:** Storing Data in Arrays – Processing Arrays with Loops and Iterations –Using Arrays with Forms - Working with Array Functions – Working with Dates and Times.	K3	9
IV	**Using Functions and Classes:** Creating User-Defined Functions- Creating Classes – Using Advanced OOP Concepts.	K3	9
V	**Working with Database and SQL :** Introducing Database and SQL- Using MySQL-Adding and modifying Data-Handling Errors –Using SQLite Extension and PDO Extension. Introduction XML - Simple XML and DOM Extension. **Current Trends-* Web Development Trends***	K4	10
	*……*Self Study.		
Course Outcome	**CO1:** Recall the concepts of PHP scripting language for the development of Internet websites.	K1	
	CO2: Understand the basic functions of MySQL database program and XML concepts.	K2	
	CO3: Build the relationship between the client side and the Server side scripts.	K3	

	CO4: Analyze the Concept of Functions and Classes.	K3	
	CO5: Examine the Database Manipulation and Handling Exceptions.	K4	

Learning Resources				
Text Books	Vikram Vaswani, “PHP A Beginner's Guide”, Tata McGraw Hill, 2008.			
Reference Books	1. Steven Holzner, “The PHP Complete Reference”, Tata McGraw Hill, 2007. 2. Steven Holzner, “Spring into PHP”, Tata McGraw Hill 2011, 5thEdition.			
Website Link	https://www.w3schools.com/php/ https://www.phptpoint.com/php-tutorial-pdf/			
Self-Study Material	https://blog.hubspot.com/website/web-development-trends			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

List of Programs:

1. Write a PHP program which adds up columns and rows of given table
2. Write a PHP program to compute the sum of first n given prime numbers
3. Write a PHP program to find valid an email address
4. Write a PHP program to convert a number written in words to digit.
5. Write a PHP script to delay the program execution for the given number of seconds.
6. Write a PHP script, which changes the colour of the first character of a word
7. Write a PHP program to find multiplication table of a number.
8. Write a PHP program to calculate Factorial of a number.
9. Write a PHP code to create a student mark sheet table. Insert, delete and modify records.
10. From a XML document (email.xml), write a program to retrieve and print all the email addresses from the document using XML.
11. From a XML document (tree.xml), suggest three different ways to retrieve the text Value 'John' using the DOM.
12. Write a program that connects to a MySQL database and retrieves the contents of any One of its tables as an XML file. Use the DOM.

B.Com CA Syllabus LOCF – CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M3UCCA03	**WEB TECHNOLOGY(PHP)**	**GEC THEORY**	**III**	**4**	**2**	**-**	**2**	**3**	

CO – PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	S	M	S	M	S
CO2	S	M	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	M	S	S	M	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.P.Mohankumar	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCCA04	**PROGRAMMING IN JAVA**	**GEC THEORY**	**III**	**3**	**1**	**-**	**2**	**3**
Objective	Students Learn the fundamental knowledge of object-oriented programming and equip with programming in JAVA.							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction: Review of Object-Oriented concepts - Java buzzwords (Platform independence, Portability, Threads)- JVM architecture –Java Program structure - –Java main method - Java Console output(System.out) - simple java program - Data types - Variables - type conversion and casting- Java Console input: Buffered input - operators - control statements - Static Data - Static Method - String and String Buffer Classes.	K1	6
II	Java user defined Classes and Objects – Arrays – constructors - Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword .	K2	6
III	Packages: Definition - Access Protection - Importing Packages -Interfaces: Definition – Implementation – Extending Interfaces. Exception Handling: try – catch - throw - throws –- finally – Built-in exceptions - Creating own Exception classes - garbage collection, finalize.	K3	6
IV	Multithreaded Programming: Thread Class - Runnable interface – Synchronization – Using synchronized methods – Using synchronized statement - Interthread Communication – Deadlock.	K4	6
V	Adapter classes - Inner classes -Java Util Package / Collections. Framework: Collection & Iterator Interface- Enumeration- List and ArrayList- Vector- Comparator ***Current Trends: DevOps, Git, Remote Access Solutions Serverless Architecture, Artificial Intelligence (AI).***	K5	6
	…… Self Study.		

Course Outcome	**CO1:** Remembering the fundamental knowledge of object-oriented programming	K1	
	CO2: Understanding the basic constructs of Core Java.	K2	
	CO3: Apply the concepts inheritance, packages, interfaces and exception handling of Core Java.	K3	
	CO4: Analyze the concepts of Multithreading.	K4	
	CO5: Evaluate adapter classes.	K5	

Learning Resources	
Text Books	1Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010. 2Gary Corne, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999.
Reference Books	Head First Java, O"Rielly Publications, Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010.
Website Link	1. https://ocw.mit.edu/courses/6-092-introduction-to-programming-in-java-january-iap-2010/pages/lecture-notes/ 2. https://www.tutorialspoint.com/java/java_tutorial.pdf
Self-Study Material	https://www.knowledgehut.com/blog/programming/java-future.

	L-Lecture	T-Tutorial	P-Practical	C-Credit

List of Programs:

1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer.

2. Write a Java program to multiply two given matrices.

3. Write a Java program that displays the number of characters, lines and words in a text.

4. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.

5. Write a program to do String Manipulation using Character Array and perform the following string operations:

a) String length

b) Finding a character at a particular position

c) Concatenating two strings.

6. Write a program to perform the following string operations using String class:

a) String Concatenation

b) Search a substring

c) To extract substring from given string.

7. Write a program to perform string operations using String Buffer class:

a) Length of a string

b) Reverse a string

c) Delete a substring from the given string.

8. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

9. Write a threading program which uses the same method asynchronously to print the numbers 1 to 10 using Thread1 and to print 90 to 100 using Thread2.

10. Write a program to demonstrate the use of following exceptions. a) Arithmetic Exception b) Number Format Exception c) Array Index Out of Bound Exception d) Negative Array Size Exception

B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCCA04	**PROGRAMMING IN JAVA**	**GEC THEORY**	**III**	**3**	**1**	**-**	**2**	**3**

CO - PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	S	S	S	S	S	M	S	S	S
CO2	S	M	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	M	S	M	S
CO4	S	S	S	M	S	M	M	S	S	S
CO5	M	S	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
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B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCCA04	**RELATIONAL DATABASE MANAGEMENT SYSTEM**	**GEC THEORY**	**IV**	**3**	**3**	**-**	**-**	**3**
Objective	Students Learn the Structured Query Language (SQL) and its syntax and Apply Normalization techniques to normalize a database.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to DBMS**– Data and Information - Database – Database Management System – Objectives- Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram	K1	8
II	**Relationship Degree** – Classification – ER diagram to Tables – ISA relationship – Constraints –Aggregation and Composition – Advantages Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools –Redundancy and Data Anomaly	K2	8
III	**Normalization**: Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security	K3	8
IV	**Introduction to SQL**: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables. Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.	K4	8
V	**SQL Join Operators**: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function**.** ***Current Trends – Analytic for BIG Data*.**	K5	8
	…… Self Study.		

Course Outcome	**CO1:** Recall the basic concepts of database system		K1	
	CO2: Design a Data model and Schemas in RDBMS		K2	
	CO3: Competent in use of SQL		K3	
	CO4: Analyses functional dependencies for designing robust Database		K4	
	CO5: Create the Database using queries		K5	
Learning Resources				
Text Books	1. S. Sumathi, S. Esakkirajan, "Fundamentals of Relational Database Management System", Springer International Edition 2007.			
Reference Books	1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw Hill 2019, 7th Edition. 2. Alexis Leon & Mathews Leon, "Fundamentals of DBMS", Vijay Nicole Publications 2014, 2ndEdition.			
Website Link	1. https://nptel.ac.in/courses/106106093/ 2. https://nptel.ac.in/courses/106106095/ 3. NPTEL & MOOC courses titled Relational Database Management Systems			
Self-Study Material	1. https://www.techtarget.com/searchbusinessanalytics/definition/analytic-database 2. https://ebookcentral.proquest.com/lib/inflibnet-ebooks/detail.action?docID=4821272			
	L-Lecture	T-Tutorial	P-Practical	C- Credit

B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M4UCCA04	**RELATIONAL DATABASE MANAGEMENT SYSTEM**		**GEC THEORY**	**IV**	**3**	**3**	**-**	**-**	**3**	
CO - PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO				L-LOW			M-MEDIUM			S-STRONG
Tutorial Schedule	Group Discussion, Quiz program, Model preparation									
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation									
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE									
Designed By			**Verified By**					**Approved By**		
Mrs.K.Gayathri			**HoD - Mr.G.Selvakumar**					**Member Secretary - Dr.S.Shahitha**		

B.Com CA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCCA05	**INTRODUCTION TO DATA SCIENCE**	**GEC THEORY**	**IV**	**3**	**3**	**-**	**-**	**3**

Objective	Students Learn the various data collection and integration, exploratory data analysis, predictive modelling, descriptive modelling and effective communication.

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science.	K1	7
II	**The Data science process:** Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building - Data Visualization.	K2	7
III	**Algorithms:** Machine learning algorithms – Modelling process – Types – Supervised – Unsupervised - Semi-supervised.	K3	7
IV	**Introduction to Hadoop:** Hadoop framework – Spark – replacing Map Reduce– No SQL – ACID – CAP – BASE – types.	K3	7
V	**Case Study:** Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation. **Current Trends* : Machine Leraning - Machine Learning vs deep learning – Machine Learning Methods***	K4	8
	Self Study		

Course Outcome	**CO1:** Recall the scope and applications of data science.	K1	
	CO2: Summarize the Data Science Process.	K2	
	CO3: Utilize the basic principles and techniques of machine learning.	K3	
	CO4: Develop the Hadoop framework and it types.	K3	
	CO5: Examine the different fields of data science and machine learning.	K4	

Learning Resources	
Text Books	1.Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications 2016 2. Roger Peng, "The Art of Data Science", lulu.com 2016. 3. MurtazaHaider, "Getting Started with Data Science – Making Sense of Data with Analytics", IBM press, E-book.
Reference Books	1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali,"Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools", Dreamtech Press 2016. 2. Annalyn Ng, Kenneth Soo, "Numsense! Data Science for the Layman: No Math Added", 2015,1st Edition 3. Cathy O'Neil, Rachel Schutt, "Doing Data Science Straight Talk from the Frontline", O'Reilly Media 2013. 4. Lillian Pierson, "Data Science for Dummies", 2015 II Edition
Website Link	1. https://www.w3schools.com/datascience/ds_introduction.asp 2. https://www.geeksforgeeks.org/introduction-to-data-science/
Self-Study Material	1. https://www.ibm.com/topics/machine-learning 2. https://www.manning.com/books/introducing-data-science

	L-Lecture	T-Tutorial	P-Practical	C- Credit

B.Com CA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M4UCCA05	**INTRODUCTION TO DATA SCIENCE**	**GEC THEORY**	**IV**	**3**	**3**	**-**	**-**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	M	S	M	S
CO3	S	M	S	S	S	M	S	M	M	M
CO4	S	S	M	S	S	M	S	S	M	M
CO5	S	S	M	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG
Tutorial Schedule	Group Discussion, Quiz program, Model preparation		
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation		
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE		

Designed By	**Verified By**	**Approved By**
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B.Com CA-Syllabus LOCF-CBCS with effect from2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCCA05	**SOFTWARE ENGINEERING AND UML LAB**	**GEC THEORY**	**V**	**4**	**2**	**-**	**2**	**3**

Objective	Students Learn the software development life cycles and concepts related to structured and objected oriented analysis & design.		
Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	Introduction – Evolution – Software Development projects – Emergence of Software Engineering. Software Life cycle models – Waterfall model – Rapid Application Development – Agile Model – Spiral Model.	K1	6
II	Requirement Analysis and Specification – Gathering and Analysis – SRS – Formal System Specification.	K2	6
III	Software Design – Overview – Characteristics – Cohesion & Coupling – Layered design – Approaches Function Oriented Design – Structured Analysis – DFD – Structured Design – Detailed design.	K2	6
IV	Object Modelling using UML – OO concepts – UML – Diagrams – Use case, Class, Interaction, Activity, State Chart – Postscript.	K3	6
V	Coding & Testing – coding – Review – Documentation – Testing – Black-box, White-box, Integration, OO Testing, Smoke testing. ***Current Trends: Software Engineering recent technologies ***	K3	6
	…… Self Study.		
Course Outcome	**CO1:** Understand software requirements, design the software using tools.	K1	
	CO2: Discuss about test cases using different testing techniques.	K2	
	CO3: Analyse the software design and characteristics.		
	C04: Apply the OO concepts of UML.		
	CO5: Evaluate the various testing techniques.		

Learning Resources				
Text Books	1. Rajib Mall, "Fundamentals of Software Engineering", PHI 2018, 5th Edition. 2. Roger S. Pressman, "Software Engineering - A Practitioner's Approach", McGraw Hill 2010, 7thEdition.			
Reference Books	1. PankajJalote, "An Integrated Approach to Software Engineering", Narosa Publishing House 2011,3rd Edition			
Website Link	1. NPTEL online course – Software Engineering - https://nptel.ac.in/courses/106105182/.			
Self-Study Material	1.https://www.hackerrank.com/blog/top-software-engineering-trends/.			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

LIST OF PRACTICALS:

Using UML tools produce analysis and design models for

a. Library Management System
b. Automatic Teller Machine
c. Student Information Management
d. Matrimony Service
e. Stock Management System

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B.COM CA-Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M5UCCA05	**SOFTWARE ENGINEERING AND UML LAB**	**GEC THEORY**	**V**	**4**	**2**	**-**	**2**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	PS O5
CO1	S	S	S	M	M	S	M	S	M	M
CO2	S	S	S	S	M	S	S	S	S	S
CO3	S	L	S	S	S	S	M	S	S	S
CO4	S	S	S	M	S	S	S	S	M	S
CO5	S	S	L	M	S	S	M	S	M	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	**Verified By**	**Approved By**
Mr.M.Ravi	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

B.Com CA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M5UCCA06	**OBJECT ORIENTED ANALYSIS AND DESIGN AND UML LAB**	**GEC THEORY**	**V**	**4**	**2**	**-**	**2**	**3**
Objective	Students Learn software requirements, design the software using tools with the writing of test cases using different testing techniques.							

Unit	Course Content	Knowledge Levels	Sessions
I	Object Orientation - System development - Review of objects - inheritance - Object relationship - Dynamic binding - OOSD life cycle – Process – Analysis – Design - prototyping - Implementation – Testing - Overview of Methodologies	K1	10
II	Ram baugh methodology, OMT - Booch methodology, Jacobson methodology - patterns - Unified approach - UML Class diagram – Dynamic modelling.	K2	10
III	Introduction - UML – Meta model - Analysis and design - more information. Outline Development Process: Overview of the process-Inception - Elaboration-construction- refactoring patterns transmission-iterative development - use cases.	K3	10
IV	OODesign axioms – Class visibility – refining attributes – Methods – Access layer – OODBMS – Table – class mapping view layer	K4	10
V	Interaction diagram - package diagram - state diagram - activity diagram - deployment diagram - UML and programming. ***Current Trends- Agile and Iterative Development ***	K5	10
	…… Self Study.		
Course Outcome	**CO1:** Recall software requirements, design the software using tools	K1	
	CO2: Assess different Models in OOD.	K2	
	CO3: Analyse UML and Development Process.	K3	

	CO4: Apply the axioms and Class Mapping.			K3	
	CO5: Evaluate the interaction and activity diagram.			K4	
Learning Resources					
Text Books	Ali Bahrami, “Object Oriented System Development”, McGraw-Hill International Edition 2017. Martin Fowler, Kendall Scott, "UML Distilled", Addision Wesley Eriksson, "UML Tool Kit", Addison Wesley				
Reference Books	1. Booch G., “Object oriented analysis and design”, Addison- Wesley Publishing Company 3 rd edition.. 2. Rambaugh J, Blaha.M. Premeriani, W., Eddy F and Loresen W., “Object Oriented Modeling and Design”, PHI				
Website Link	1.https://www.geeksforgeeks.org/object-oriented-analysis-and-design/ 2.https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_uml_analysis_model.html				
Self-Study Material	1.https://study.com/academy/lesson/agile-vs-iterative-development.html#:~:text=The%20iterative%20model%20focuses%20on,continual%20process%20in%20Agile%20development.				
	L-Lecture	T-Tutorial	P-Practical	C-Credit	

LIST OF PRACTICALS:

Using UML tools produce analysis and design models for

a. Library Management System
b. Automatic Teller Machine
c. Student Information Management
d. Matrimony Service
e. Stock Management System

B.COM CA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem.**	**Hours**	**L**	**T**	**P**	**C**
23M5UCCA06	**OBJECT ORIENTED ANALYSIS AND DESIGN AND UML LAB**	**GEC THEORY**	**V**	**4**	**2**	**-**	**2**	**3**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	L	S	M	M	S
CO2	S	S	M	M	M	S	M	S	M	S
CO3	M	M	M	S	S	L	S	M	M	M
CO4	M	M	M	S	S	S	S	S	L	S
CO5	M	M	S	M	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.A.Raja	**HoD - Mr.G.Selvakumar**	**Member Secretary-Dr.S.Shahitha**

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B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCCA06	**R LANGUAGE**	**GEC PRACTICAL - I**	**VI**	**4**	**-**	**-**	**4**	**3**
Objective	Students Develop Object-oriented programming skills and designing the graphical-user interfaces (GUI) in R Programming.							

S.No.	List of Experiments / Programmes	Knowledge Levels	Sessions
1	Data In R	K1	3
2	Reading And Writing Data	K2	3
3	R And Databases	K1	3
4	Dates ,Factors	K2	3
5	Subscribing, Character Manipulation	K2	3
6	Data Aggregation ,Reshaping Data Basics	K3	3
7	The R Environment, Probability And Distributions	K3	3
8	Descriptive Statistics and Graphics, One- And Two-Sample Tests	K3	3
9	Regression And Correlation, Analysis Of Variance And The Kruskal–Wallis Test	K3	3
10	Tabular Data, Power And The Computation Of Sample Size	K3	3
11	Advanced Data Handling ,Multiple Regression	K3	3
12	Linear Models	K3	3
13	Logistic Regression	K4	3
14	Survival Analysis ,Rates And Poisson Regression	K5	3
15	Nonlinear Curve Fitting	K5	3
	CO1: Remember the concept of Database.	K1	
	CO2: Rephrase the basic programming constructs in R Programming.	K2	

Course Outcome	**CO3**: Construct the various computing strategies for R Programming -based solutions to real world problems.	K3
	CO4: Analyze the R Programming data structures - lists, tuples, dictionaries.	K4
	CO5: Determine the input / output with files in R Programming	K5

Learning Resources	
Text Books	1. W. N. Venables, D. M. Smith, An Introduction to R, R Core Team, 2018. 2. John Verzani, simple R – Using R for Introductory Statistics, CRC Press, Taylor & Francis Group, 2005. 3. Mark Gardener, —Beginning R - The Statistical Programming Language, John Wiley & Sons.
Reference Books	1. Beginner's guide for Data Analysis using R Programming by Dr.Jeeva Jose. 2. P. Dalgaard. Introductory Statistics with R, 2nd Edition. Springer 2008. 3. Dunlop, Dorothy D., and Ajit C. Tamhane. Statistics and data analysis: from elementary to intermediate. Prentice Hall, 2000.
Website Link	1. https://www.geeksforgeeks.org/r-programming-language-introduction/

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Com CA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCCA06	**R LANGUAGE**	**DSE PRACTICAL - I**	**VI**	**4**	**-**	**-**	**4**	**3**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Sample programs to the related topics
Teaching and Learning Methods	Handling practical session through projector
Assessment Methods	Observation, Model practical's.

Designed By	Verified By	Approved By
Mrs.N.Padmapriya	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

B.Com PA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UPAA02	**R PROGRAMMING**	**GEC THEORY**	**IV**	**3**	**3**	**-**	**-**	**3**
Objective	Students Learn the basic commands of R Language, apply concatenation functions, control statements, repetitive execution for loops and use High-Level Plotting commands with graphics parameters.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to R Programming:** simple manipulation, numbers and Vectors Introduction-The R Environment-Related Software and Documentation-R and Statistics-R and The Window System-Using R Interactively – Functions and Features – R Commands – Recall and Correction of Previous Commands- Executing Commands from or Diverting Output to a File – Data Permanency and Removing Objects. **Simple Manipulations, Numbers and Vectors:** Vectors and Assignment-Vector Arithmetic- Generating Regular Sequences-Logical Vectors Missing Values-Character Vectors – Index Vector-Selecting.	K1	10
II	**Objects arrays and matrixes Objects, Modes and Attributes:** Intrinsic Attributes- Mode and Length- Changing The Length of an Object-Getting and Setting Attributes – The Class of an Object. **Ordered and Unordered Factors:** The Functions Tapply () and Ragged Arrays – Ordered Factor. **Arrays and Matrices:** Array Indexing- Subsection of an Arrays Index Matrices- The Array() Function- Mixed Vector and Array Arithmetic – The Recycling Rule- The Outer Product of Two Arrays Generalize Transpose of an Array- Matrix Facilities- Matrix Multiplication.	K2	8

III	**Lists and Data-frames Lists:** Constructing and Modifying Lists – Concatenation – Data Frames – Making Data Frames Attach()and De attach() – Working With Data Frames. **Reading Data From Files:** The Scan() Function Accessing Built-In Datasets- Loading Data From Other R Packages.	K3	8
IV	**Grouping, Loops and Conditional Execution:** Grouped Expressions - Control Statements- Conditional Execution If Statements- Repetitive Execution For Loops, Repeat and While.	K4	6
V	**Graphical Procedures:** High-Level Plotting Commands-The Plot() Function Displaying Multivariate Data- Display Graphics- Arguments To High Level Plotting Functions-Low Level Plotting Commands- Mathematical Annotation-Hersley Vector Fonts- Interacting With Graphics-Using Graphics Parameters-Graphics Parameters List. **Current Trends- *Big data with R***	K5	8
	…… Self Study.		
Course Outcome	**CO1:** Learn the basic knowledge on R - Environment with basic commands using R - Functions.	K1	
	CO2: Illustrate the concepts of objects, modes and arrays.	K2	
	CO3: Choose the list, data-frames and accessing the data in datasets.	K3	
	CO4: Inspect Work with Impart knowledge of Grouping, Loops and Conditional Execution.	K4	
	CO5: Justify the Graphical procedure with low level and high level plotting.	K5	
Learning Resources			

Text Books	1. W. N. Venables, D. M. Smith, An Introduction to R, R Core Team, 2018. 2. John Verzani, simple R – Using R for Introductory Statistics, CRC Press, Taylor & Francis Group, 2005. 3. Mark Gardener, —Beginning R - The Statistical Programming Language, John Wiley & Sons. 4. Wickham, H. &Grolemund, G. (2018). for Data Science. O'Reilly: New York.			
Reference Books	1. Beginner's guide for Data Analysis using R Programming by Dr.Jeeva Jose. 2. P. Dalgaard. Introductory Statistics with R, 2nd Edition. Springer 2008. 3. Dunlop, Dorothy D., and Ajit C. Tamhane. Statistics and data analysis: from elementary to intermediate. Prentice Hall, 2000. 4. Norman Matloff, The Art of R Programming- A Tour of Statistical Software Design.			
Website Link	1. https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf 2. https://www.geeksforgeeks.org/r-programming-language-introduction/			
Self-Study Material	https://rviews.rstudio.com/2019/07/17/3-big-data-strategies-for-r/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Com PA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M4UPAA02	**R PROGRAMMING**	**GEC THEORY**	**IV**	**3**	**3**	**-**	**-**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	S	S	S	M	M	S	S	S
CO2	S	M	M	S	S	M	S	S	M	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	M	S	M	M	S	S	S
CO5	S	M	S	S	S	S	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mr.K.Vijayakumar	**HoD - Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
RASIPURAM - 637408.

B.Com PA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UPAA03	**PYTHON PROGRAMMING**	**GEC THEORY**	**V**	**4**	**2**	**2**	**-**	**3**
Objective	Students Learn the fundamental concepts of Python programming and its Libraries, packages for data analysis, modeling, visualization in python language.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction:** Computer systems – Python Programming Language Computational Thinking – Python Data Types - Expressions, Operator, Variables, and Assignments – Strings – Lists – Objects & Classes – Python standard library.	K1	10
II	**Imperative programming**: Python modules. **Built-in-function:** print () function –eval() function – user-defined function & assignments - parameter passing.	K2	9
III	**Text Data, Files & Exceptions:** Strings, revisited – formatted output – files – errors & Exceptions – Execution. **Control Structures:** decision control & the IF statement. For LOOP & Iteration Patterns – two-dimensional list while loop – more loop patterns– additional iteration control statements. **Container and Randomness:** Dictionaries – other built-in container types – character encodings & strings – module random. Namespaces – encapsulation in functions – global vs. local namespaces exceptional flow control – modules as namespaces.	K3	12
IV	**NumPy Basics:** Array and Vectorized Computation – A Multidimensional Array Object – Data Processing using Arrays, File Input and Output with Arrays – Linear Algebra – Random Number Generation.	K4	8

V	Pandas – Data Structure – Essential Functionality – Handling Missing Data – Hierarchical Indexing – Data loading, Storage and File formats Data wrangling- Plotting and Visualization -Time Series – Financial and Economic Data applications. ***Current Trends - Web Development- Game development - Data visualization*.**	K5	9
	…… Self Study.		
Course Outcome	**CO1:** Recall the basic programming terminologies and packages of python language.	K1	
	CO2: Illustrate the Concepts and packages for data analysis, modeling, and visualization in python language.	K2	
	CO3: Organize the Concept of Exceptions and Looping.	K3	
	CO4: Examine the NumPy basics and Arrays.	K4	
	CO5: Determine the Concept of Pandas , Plotting and Visualization techniques.	K5	

Learning Resources	
Text Books	1. Wes McKinney, Python for Data Analysis, O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol. 2. Kenneth A. Lambert – Fundamentals of Python First Programs - Cengage ,New Delhi 3.ChSatyanarayana, M Radhika Mani, BN Jagadesh - Python Programming-Cengage,New Delhi.
Reference Books	1. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes Ljubomir Periodic, — Introduction to Computing Using Python: An Application Development Focus‖, John Wiley & Sons,2012 2. Shymala Devi, Python Programming, Vijay Nicole Imprints, Chennai 3. Wesley J. Chun, —Core Python Programming‖, Pearson Education.
Website Link	1. https://onlinecourses.nptel.ac.in/noc20_cs46/preview 2. https://bedford-computing.co.uk/learning/wp-content/uploads/2015/10/Python-for-Data-Analysis.pdf
Self-Study Material	https://onlinecourses.nptel.ac.in/noc20_cs46/preview

	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Com PA Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Title	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M5UPAA03	**PYTHON PROGRAMMING**	**GEC THEORY**	**V**	**4**	**2**	**2**	**-**	**3**	

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	M	S
CO2	L	M	L	S	M	S	S	M	S	S
CO3	M	S	S	M	S	S	S	S	M	S
CO4	S	M	M	S	S	S	M	M	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group Discussion, Quiz program, Model preparation
Teaching and Learning Methods	Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video Presentation
Assessment Methods	Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE

Designed By	Verified By	Approved By
Mrs.S.Shahana	**HoD – Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

B.C.A Syllabus LOCF-CBCS with effect from 2024-2025 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCAIS1	**INTERNSHIP**	**INTERNSHIP**	**V**	**-**	**-**	**-**	**-**	**2**
Objective	Students learn the optimum exposure on the practical aspects of IT industry							

S. No.	Guidelines for Internship Training Programme	Knowledge Levels	Sessions
1	The student should undergo **15 Days Internship** training in IT industry / Private sector during the vacation which starts at the end of the 4th Semester.	K2-K4	
2	The training bridges the gap between the theoretical knowledge gained in the college and the practical application of the same in the institute / industry / company. The student will have a better exposure about the workplace and its nuances.		
3	Schedule of visit to be made by the staff is to be prepared by the HOD / Staff-in-charge.		
4	The trainees should strictly adhere to the rules and regulations and working hours of the institutions to which they are attached.		
5	A Staff member of a Department (Guide) will be monitoring the performance of the Candidate.		
6	The students should maintain a daily logbook where the student should record his details of the training.		
7	The trainees have to obtain a certificate on successful completion of the internship from the chief executive of an organization.		
8	The student should submit an attendance certificate to the institution for 15 days internship training from an organization.		
9	Internship Training Report (30 – 50 pages) should be prepared by the student and submitted in a month's time and at the end of the semester student should present the report with a power point presentation.		
10	Industrial training reports shall be prepared by the students under the supervision of the faculty of the department.		
11	Industrial training report must contain the following: Cover page, Copy of training certificate, Profile of an industry report about the work undertaken by them during the tenure of training observation about the concern findings.		

12	Viva – voce examination will be conducted with internal & external examiners at the end of the **5th semester** and the credits will be awarded.		
13	Report Evaluation: External Viva-Voce examination will be conducted and the maximum mark is 100.		
Course Outcome	**CO1:** Apply new techniques and ideas in IT industry	K3	
	CO2: Analyze the results of new initiatives	K4	
	CO3: Create a new work plan with greater output	K6	
	CO4: Create a framework of work execution ideas	K6	
	CO5: Create a detailed technical work plan and terminologies to be followed in industry.	K6	
Learning Resources			
Website Link	1.https://www.tutorialspoint.com/r/index.htm 2.https://www.javatpoint.com/net-framework 3.https://www.w3schools.com/java/java_intro.asp 4.https://www.w3schools.com/r/		

B.C.A Syllabus LOCF-CBCS with effect from 2024-2025 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M5UCAIS1	**INTERNSHIP**	**INTERNSHIP**	**V**	**-**	**-**	**-**	**-**	**2**	

CO-PO Mapping									
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	S	S	S	S	M	S	S	S	S
CO2	S	M	S	S	S	S	M	S	S	S
CO3	M	S	S	S	S	M	S	S	S	S
CO4	S	M	S	S	S	S	M	S	S	S
CO5	M	S	S	S	S	M	S	S	S	S
Level of Correlation between CO and PO		L-LOW		M-MEDIUM			S-STRONG			

Tutorial Schedule	-
Teaching and Learning Methods	-
Assessment Methods	**CIA – 100 Marks** 1. Work Log Book – 25 Marks 2. Training Report and Viva-Voce – 75 Marks

Designed By	Verified By	Approved By
Mr.K.Vijayakumar **Mrs.N.Padmapriya** **Mrs.K.Gayathri** **Mr.M.Purusothaman**	**HoD – Mr.G.Selvakumar**	**Member Secretary – Dr.S.Shahitha**

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCAPR1	**PROJECT WORK**	**PROJECT WORK**	**VI**	**-**	**-**	**-**	**4**	**4**
Objective	To grasp the real-time software development environment and acquire comprehensive knowledge of the chosen problem and programming language/software for their project work.							

Guidelines for Project Work and Viva Voce

PROJECT PLANNING:

Bachelor of Computer Application Project is a complex undertaking that requires meticulous planning well in advance. The topic must be selected at the beginning of the final year, with related reading, training, and project discussions to be completed during the first term.

SELECTION OF TEAM:

Mini project is approached collaboratively as a team effort. It is recommended to select team members randomly, practical considerations may allow students the option to self-organize into teams of two members each, with a designated team leader. Each team must maintain written minutes of meetings and ensure clear assignment of tasks to every member. These meeting minutes will be incorporated into the project report. Despite working in groups, each student must independently handle distinct modules of the project and submit individual reports.

SELECTION OF TOOLS:

Students are free to choose any platform, tools, or programming languages for their project work, with a strong recommendation towards open source options wherever feasible. The evaluation of the project will not consider the choice of tools as a criterion.

REGULATIONS OF PROJECT WORK

Three copies of the project report must be submitted by each student.

- The final outer dimensions of the project report shall be 21cm X 30 cm.
- Only hard binding should be done. The text of the report should be set in 12pt, Times New Roman, 1.5 spaced. Headings should be set as follows: CHAPTER HEADINGS 16pt, Times New Roman, Bold, All caps and Centered.

Section Headings 14pt Times New Roman, Bold, Left adjusted. Section Sub-heading 12pt, Times New Roman.

- Title of figures, tables etc.., are done in 12 point, Times New Roman, Bold and Centered.
- 1.5 space need be left above a section or subsection heading and no space may be left after them. References shall be IEEE format (see any IEEE magazine for detail).

- While doing the project keep note of all books you refer, in the correct format and include them in alphabetical order in your reference list. The Candidate should submit the filled in format as given in Annexure-I to the department for approval during the First Week of December.
- Periodically the project should be reviewed.
- A Sample format is enclosed in Annexure-II.
- Format of the Title page and Certificate are enclosed in Annexure III.
- The students may use power point presentation during their viva voce examination.

Course Outcome	**CO1:** Identification of Research Area	K4	
	CO2: Analyze of problem solving skills	K4	
	CO3: Analyze sources for conduct of Research	K4	
	CO4: Evaluate the research report	K5	
	CO5: Create the research report	K6	

Learning Resources	
Text Books	1. Research Methodology: Methods and Techniques, by C.R. Kothari, New Age Publications, 2009.
Reference Books	1. Research Methodology: Methods and Techniques by C.R. Kothari, New Age Publications, 1985. 2. Essentials of Research Design and Methodology by: Geoffrey R. Marczyk, David DeMatteo, David Festinger, 2005.
Website Link	1. http://gen.lib.rus.ec/

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M6UCAPR1	**PROJECT WORK**	**PROJECT WORK**	**VI**	**-**	**-**	**-**	**4**	**4**	

CO-PO Mapping									
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	M	S	M	M	S	S	S
CO2	S	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	M
CO4	S	S	S	M	S	S	S	S	M	M
CO5	M	M	M	S	S	M	M	S	S	S
Level of Correlation between CO and PO	L-LOW			M-MEDIUM			S-STRONG			

Tutorial Schedule	-
Teaching and Learning Methods	Working with programming languages such as R, Python, Java, .Net, etc..,
Assessment Methods	Attendance, Review / Work Diary, Final Report and Viva Voce

Designed By	Verified By	Approved By
Mr.K.Vijayakumar **Mrs.N.Padmapriya** **Mrs.K.Gayathri** **Mr.M.Purusothaman**	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**

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BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCAOE1	**PROFESSIONAL COMPETENCY SKILL (Self Study)**	**COMPUTER APPLICATION FOR COMPETITIVE EXAMINATION**	**VI**	**-**	**-**	**4**	**-**	**4**
Objective	Creating awareness among students about competitive examinations, imparting knowledge on their impact, and fostering a positive attitude towards appearing in such exams.							

Guidelines for Competitive Examination

This course comprehensively covers Python, Data Structures and algorithms, Open Source Software Technologies, Operating Systems, Problem Solving Techniques, Database Management Systems, Computer Networks, Programming Languages (with a focus on Java), Artificial Intelligence, and Machine Learning.

It emphasizes recent advancements in these fields and aims to provide a holistic understanding through factual content and multiple-choice questions (MCQs). This makes it highly suitable for university and institute students preparing for entrance exams, as well as those gearing up for national and state-level competitive exams like TANCET, IBPS, and SSC, which follow an MCQ format.

1. Objective type online examination will be conducted at the end of 6th semester.
2. Questions must be taken from all courses of the Data Science Programme.
3. Test critical thinking through multiple-choice questions that challenge learners to interpret facts, evaluate situations, explain cause and effect relationships, make inferences, and predict outcomes.
4. Emphasize higher-level thinking with memory-plus application-oriented questions that prompt students to recall principles, rules, or facts within real-life contexts.
5. HOD's instruct to the faculty to prepare minimum 500 questions booklet (cumulatively for each programme) with solutions and circulate among the students.

Course Outcome	**CO1:** Remember the fundamental techniques for implementing programming languages.	K1	
	CO2: Interpret problem solving techniques to develop skills for competitive exams.	K2	
	CO3: Organize Computational problems for real time problems.	K3	

	CO4: Analyze Computer techniques and software development fundamentals to produce computing-based solutions	K4	
	CO5: Evaluate complex computing problems to apply fundamental computing principles effectively.	K5	
Learning Resources			
Reference Books	1. Computer Knowledge for SBI/ IBPS Clerk/ PO/ RRB/ RBI/ SSC/ Insurance Exams 2nd Edition, Disha Publication. 2. M.C.Qs For Competitive Exams Computer Science, LBH Authors' Division, Library Book House.		
Website Link	1. https://nptel.ac.in/courses/106106092 2. https://www.digimat.in/nptel/courses/video/106101061/L01.html 3. https://www.digimat.in/nptel/courses/video/106104122/L01.html		

BCA Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCAOE1	**COMPUTER APPLICATION FOR COMPETITIVE EXAMINATION**	**PROFESSIONAL COMPETENCY SKILL (Self Study)**	**VI**	**-**	**-**	**4**	**-**	**4**

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S	M	M	S	S	S
CO2	S	S	S	S	S	M	S	S	S	S
CO3	L	M	S	S	M	S	S	S	M	M
CO4	M	S	L	M	S	L	S	S	M	M
CO5	M	M	M	S	S	M	M	S	S	S

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	-
Teaching and Learning Methods	Learning Computer Science Courses.
Assessment Methods	CIA I and CIA II Exams

Designed By	Verified By	Approved By
Mr.K.Vijayakumar **Mrs.N.Padmapriya** **Mrs.K.Gayathri** **Mr.M.Purusothaman**	**HoD - Mr.G.Selvakumar**	**Member Secretary - Dr.S.Shahitha**