Study & Evaluation Scheme

of

Bachelor of Computer Application

[Applicable for Batch 2022-25]

[As per CBCS guidelines given by UGC]

Approved in BOS	Approved in BOF	Approved in Academic Council
14/05/2022	8/08/2022	20/10/2022 Vide Agenda No 8.4.1

Quantum University, Roorkee
22 KM Milestone, Dehradun-Roorkee Highway, Roorkee (Uttarakhand)
Website: www.quantumuniversity.edu.in

Study & Evaluation Scheme

Study Summary

Name of the Faculty	Faculty of Computer Application
Name of the School	Quantum School of Technology
Name of the Department	Department of Computer Application
Program Name	Bachelor of Computer Application
Duration	3 Years
Medium	English

Evaluation Scheme

Type of Papers	**Internal Evaluation (%)**	**End Semester Evaluation (%)**	**Total (%)**
Theory	40	60	100
Practical/ Dissertations/Project Report/ Viva-Voce	40	60	100
Internal Evaluation Components (Theory Papers)			
Mid Semester Examination	60 Marks		
Assignment –I	30 Marks		
Assignment-II	30 Marks		
Attendance	50 Marks		
Internal Evaluation Components (Practical Papers)			
Quiz One	30 Marks		
Quiz Two	30 Marks		
Quiz Three	30 Marks		
Lab Records/ Mini Project	30 Marks		
Attendance	50 Marks		
End Semester Evaluation (Practical Papers)			
ESE Quiz	40 Marks		
ESE Practical Examination	40 Marks		
Viva- Voce	20 Marks		

Structure of Question Paper (ESE Theory Paper)

The question paper will consist of 5 questions, one from each unit. Student has to Attempt all questions. All questions carry 20 marks each. Parts a) and b) of question Q1 to Q5 will be compulsory and each part carries 2 marks. Parts c), d) and e) of Q1 to Q5 Carry 8 marks each and the student may attempt any 2 parts.

Important Note:

1. The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to attainment Programme Outcomes (PO). A question paper must assess the following aspects of learning as planned for a specific course i.e Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy). The standard of question paper will be based on mapped BL level complexity of the unit of the syllabus, which is the basis of CO attainment model adopted in the university.

2. Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.

3. There shall be continuous evaluation of the student and there will be a provision of real time reporting on QUMS. All the assignments will evaluated through module available on ERP for time and access management of the class.

Program Structure – Bachelor of Computer Application

Introduction

Bachelor of Computer Application (BCA) is ideal for those who love computers and want to delve deeper into how they operate, software, hardware and related tools and technologies. So, let's explore more about this course, the career scope of BCA and see what it has to offer.

BCA Scope

Bachelor in Computer Application (BCA) is generally offered as a 3 year degree course that aims to impart to students with knowledge of software development and programming, Java, C++, computer networking and Database Management. Any individual with high school qualifications can apply for this course. There is an extensive scope of BCA in contemporary times as graduates can choose from a varied range of opportunities like web designing, computer programming, database administration, amongst others.

Further, as the global tech industry paces towards newer heights, the demand for software developers and programmers is only rising up. The immense BCA scope opens up a lot of opportunities for the students. One of the perks it offers is stream versatility. Even those students who opted for Arts or Commerce stream in high school can opt for a BCA degree and steer towards a career in website or app development and software designing which was a field only reserved for science students earlier.

Career Scope of BCA

For those who choose to directly explore job opportunities after completing their undergraduate degree, BCA is a skill-oriented course and thus getting a job is comparatively easier for graduates as compared to purely academic courses like BSc or B.Com. There are lucrative career opportunities in the private and public sector for BCA graduates. So, if you are wondering what to after BCA, here are some of the jobs that come under the scope of BCA:

1. Web Developer
2. Database Administrator
3. Software Developer
4. Software Developer
5. Computer Programmer
6. System Engineer
7. Computer Systems Analyst

8. System Administrator/ IT Administrator
9. Computer Scientist

Scope of BCA in the Government Sector

Apart from private sectors, completing a BCA degree opens up numerous opportunities in various Government sectors. They can get job offers like Probationary officer, Army and Navy, IAS, IPS, CBI, RRB and UPSC. There are several graduate-level entrance exams that are conducted where only BCA degree holders can apply for which grants entry into these Government sectors like UPSC, CDSE, SSC CGL, etc.

BCA Scope in India and Abroad

The IT sector is among the highest paying fields for BCA graduates in India and abroad. BCA scope is immense with lot of job opportunities. You will be eligible for entry level jobs or go for further studies such as MCA or MBA. From banks to game designing firms it is easy to find job if you have relevant knowledge and skills. Students can also work freelance or in big MNCs all over the world.

Major Employment Areas

Owing to the extensive BCA scope, graduates can choose from a plethora of sectors offering lucrative job opportunities. Here are the popular employment sectors for BCA graduates:

- Financial Institutions
- Banks
- Consultancies
- IT Companies
- Multimedia & Animation
- Graphic Design
- Actuaries
- Security & Surveillance
- Game Designing
- Software Development Companies

Curriculum (22-25) Version 2022.03

Quantum School of Technology

Department of Computer Applications

Bachelor of Computer Applications– PC: 01-03- 11

BREAKUP OF COURSES

Sr. No	CATEGORY	CREDITS BCA - Normal	CREDITS BCA-MAWT
1	Foundation Core (FC)	13	21
2	Program Core (PC)	88	91
3	Program Electives (PE)	12	8
4	Open Electives (OE)	9	9
5	Internship Presentation	2	2
6	Value Added Programs (VAP)	10	10
7	Disaster Preparedness & Management*	2*	2*
8	General Proficiency	5	5
	TOTAL NO. OF CREDITS	**139**	**146**

*Non-CGPA Audit Course

SEMESTER-WISE BREAKUP OF CREDITS – BCA (Normal)

Sr. No.	CATEGORY	SEM 1	SEM 2	SEM 3	SEM 4	SEM 5	SEM 6	TOTAL
1	Foundation Core	8	1	1	-	-	3	13
2	Program Core	9	17	18	19	9	16	88
3	Program Electives	-	-	-	-	6	6	12
4	Open Electives	-	3	3	3	-	-	9
5	Internship Presentation	-	-	1	-	1	-	2
6	VAP	2	2	2	2	2	-	10
7	Disaster Preparedness & Management*	2*	-	-	-	-	-	2*
8	General Proficiency	1	1	1	1	1	-	5
	TOTAL CREDITS	20	24	26	25	19	25	139

***Non-CGPA Audit Course**

MINIMUM CREDIT REQUIREMENT = 139

SEMESTER-WISE BREAKUP OF CREDITS – BCA - MAWT (Specialization)

Sr.No.	CATEGORY	SEM 1	SEM 2	SEM 3	SEM 4	SEM 5	SEM 6	TOTAL
1	Foundation Core	8	8	1	-	-	4	21
2	Program Core	9	14	17	23	12	16	91
3	Program Electives	-	-	-	-	4	4	8
4	Open Electives	-	3	3	3	-	-	9
5	Internship Presentation	-	-	1	-	1	-	2
6	VAP	2	2	2	2	2	-	10
7	Disaster Preparedness & Management*	-	2*	-	-	-	-	2*
8	General Proficiency	1	1	1	1	1	-	5
	TOTAL CREDITS	20	28	25	29	20	24	146

*Non-CGPA Audit Course

MINIMUM CREDIT REQUIREMENT = 146

SEMESTER 1

Course Code	Category	COURSE TITLE	L	T	P	C	VerVersion	Course Prerequisite
CA 3107	FC	C Programming	3	1	0	4	1.0	Nil
CA 3102	PC	Discrete Mathematics	3	2	0	4	1.0	Nil
PS 3101	FC	Human Values & Ethics	2	0	0	2	1.0	Nil
CA 3104	PC	Open Source Software and Linux	3	2	0	4	1.0	Nil
CA 3144	FC	C Programming lab	0	0	2	2	1.0	Nil
CA 3143	PC	Open Source Software and Linux Lab	0	0	2	1	1.0	Nil
CE 3102	FC	Disaster Preparedness & Management	2	0	0	2*	1.0	Nil
VP 3101	VP	Communication and professional skill- I	0	0	2	2	1.0	Nil
GP3101	GP	General Proficiency	0	0	0	1		
		TOTAL	**13**	**5**	**6**	**20**		

*Non-CGPA Audit Course

Contact Hrs: 24

SEMESTER 2

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Pre-requisite
CA 3204	PC	Software Engineering	3	1	0	4	1.0	Nil
CA 3205	PC	Fundamentals of Data Structures	3	1	0	4	1.0	Nil
CA 3244	PC	Data Structures Using Advance C Lab	0	0	4	2	1.0	Nil
	OE	Open Elective I	3	0	0	3	1.0	Nil
HU 3202	FC	United Nations Development Program	1	0	0	1	1.0	Nil
GP3201	GP	General Proficiency	0	0	0	1		
			10	**2**	**4**	**15**		

BCA-MAWT Specialization

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
MA 3209	FC	Mathematics – II	3	0	0	3	1.0	Nil
CA 3209	PC	Object Oriented Programming with Java	2	0	0	2	1.0	Nil
EG 3210	FC	Communicative English	2	1	0	3	1.0	Nil
CA 3211	PC	Foundation Course-CAP (Mobile Application)	2	0	0	1	1.0	Nil
CA 3213	FC	Critical Thinking & Multi-Cultural Competencies.	2	0	0	1	1.0	Nil
VP 3203	VP	Value Added Program – II (We Code II)	0	0	2	2	1	Nil
CA 3247	PC	Object Oriented Programming with Java Lab	0	0	2	1	1.0	Nil
CE3102	FC	Disaster Preparedness & Management	2	0	0	2*	1.0	Nil
		TOTAL	**23**	**3**	**8**	**28***		

Contact Hrs: 34

BCA - Normal

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA 3206	PC	Object Oriented Programming Using C++	3	1	0	4	1.0	Nil
CA 3243	PC	Object Oriented Programming Using C++ Lab	0	0	4	2	1.0	Nil
CA 3242	PC	Hardware Maintenance Lab	0	0	2	1	1.0	Nil
VP 3201	VP	Value Added Program II	0	0	2	2	1.0	Nil
		TOTAL	**13**	**3**	**12**	**24**		

Contact Hrs: 28

Open Elective I (BCA – Normal)

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CE3011	OE	Carbon Emission & Control	3	0	0	3	1.0	Nil
CS3021	OE	Mining and Analysis of Big data	3	0	0	3	1.0	Nil
AG3011	OE	Ornamental Horticulture	3	0	0	3	1.0	Nil
BB3011	OE	Entrepreneurial Environment in India	3	0	0	3	1.0	Nil
JM3011	OE	Media Concept and Process (Print and Electronic)	3	0	0	3	1.0	Nil
HM3011	OE	Indian Cuisine	3	0	0	3	1.0	Nil
MB3011	OE	SAP 1	3	0	0	3	1.0	Nil
EG3011	OE	French Beginner A1	3	0	0	3	1.0	Nil
MT3011	OE	Elementary Robotics	3	0	0	3	1.0	Nil

Open Elective – BCA (MAWT)

	OE	Internet of Things	3	0	0	3	1.0	Nil

SEMESTER 3

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA 3305	PC	Relational Database Management	3	0	0	3	1.0	Nil
CA 3304	PC	Operating System	3	0	0	3	1.0	Nil
CA 3341	PC	Relational Database Management Lab	0	0	2	1	1.0	Nil
CA 3342	PC	Python Programming Lab	0	0	4	2	1.0	Nil
HU 3201	FC	Indian Knowledge System	1	0	0	1	1.0	Nil
CA 3370	FW	Internship Presentation	0	0	2	1	1.0	Nil
	OE	Open Elective II	3	0	0	3	1.0	Nil
GP3301	GP	General Proficiency	0	0	0	1		
			10	**0**	**8**	**15**		

BCA-MAWT Specialization

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA 3306	PC	Web Programming -CAP-II	3	0	0	3	1	Nil
CA 3307	PC	Python Programming	3	1	0	4	1	Nil
CA 3343	PC	Web Programming -CAP-II Lab	0	0	2	1	1	Nil
VP 3303	VP	Value Added Program III	0	0	2	2	1	Nil
		TOTAL	**16**	**1**	**12**	**25**		

Contact Hrs: 30

BCA-Normal

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA 3301	PC	Programming in Java	3	2	0	4	1.0	CA 3203
CA 3303	PC	Digital Logic Fundamentals	3	2	0	4	1.0	Nil
CA 3340	PC	Programming in Java Lab	0	0	2	1	1.0	Nil
VP 3301	VP	Value Added Program III	0	0	2	2	1.0	Nil
		TOTAL	**16**	**4**	**12**	**26**		

Contact Hrs: 32

Open Elective II

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CE3013	OE	Environment Pollution and Waste Management	3	0	0	3	1.0	Nil
CS3023	OE	Big Data Analytics: HDOOP Framework	3	0	0	3	1.0	Nil
AG3013	OE	Organic farming	3	0	0	3	1.0	Nil
BB3013	OE	Establishing a New Business	3	0	0	3	1.0	Nil
JM3013	OE	Photo Journalism	3	0	0	3	1.0	Nil
HM3013	OE	Chinese Cuisine	3	0	0	3	1.0	Nil
MB3013	OE	SAP 3	3	0	0	3	1.0	Nil
EG3013	OE	French Intermediate B1	3	0	0	3	1.0	Nil
EG3002	OE	Report Writing	3	0	0	3	1.0	Nil

SEMESTER 4

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA 3401	PC	Computer Networks	3	2	0	4	1.0	Nil
CA 3402	PC	Computer Organization	3	2	0	4	1.0	Nil
CA 3405	PC	C#.Net	3	1	0	4	1.0	Nil
CA 3440	PC	Computer Networks Lab	0	0	2	1	1.0	Nil
CA 3442	PC	C#.Net Lab	0	0	2	1	1.0	Nil
	OE	Open Elective III	3	0	0	3	1.0	Nil
GP3401	GP	General Proficiency	0	0	0	1		
			12	**5**	**4**	**18**		

All students are required to attend 04 to 06 weeks Industrial Training after 4th semester. This training willbe evaluated and awarded in 5th Semester.

BCA-MAWT Specialization

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA 3406	PC	Interactive Web Application Development	3	0	0	3	1	Nil
CA 3407	PC	Android Application Development-CAP-III	3	0	0	3	1	Nil
CA 3443	PC	Interactive Web Application Development Lab	0	0	4	2	1	Nil
CA 3444	PC	Android Application Development-CAP Lab	0	0	2	1	1	Nil
VP 3403	VP	Value Added Program IV (We Code -IV)	0	0	2	2	1	Nil
		TOTAL	**18**	**5**	**12**	**29**		

Contact Hrs: 36

BCA-Normal

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA 3403	PC	Web Technology	3	2	0	4	1.0	Nil
CA 3441	PC	Web Technology Lab	0	0	2	1	1.0	Nil
VP 3401	VP	Value Added Program IV	0	0	2	2	1.0	Nil
		TOTAL	**15**	**7**	**8**	**25**		

Contact Hrs: 30

Open Elective III

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CE3015	OE	Hydrology	3	0	0	3	1.0	Nil
CS3025	OE	Data Science Models : Regression, Classification and Clustering	3	0	0	3	1.0	Nil
AG3015	OE	Musroom Cultivation	3	0	0	3	1.0	Nil
BB3015	OE	E-commerce	3	0	0	3	1.0	Nil
JM3015	OE	Media industry and Management	3	0	0	3	1.0	Nil
HM3015	OE	Italian Cuisine	3	0	0	3	1.0	Nil
MB3015	OE	SAP 5	3	0	0	3	1.0	Nil
EG3015	OE	French Advance C1	3	0	0	3	1.0	Nil
MT3015	OE	Robotic Industry 4.0	3	0	0	3	1.0	Nil

SEMESTER 5

Course Code	Category	COURSE TITLE	L	T	P	C	Version on	Course Prerequisite
CA 3501	PC	PHP and MYSQL Programming	3	0	0	3	1.0	Nil
EE 3503	PC	Mobile Technology	3	0	0	3	1.0	Nil
CA3543	PC	MYSQL and PHP Programming Lab	0	0	2	1	1.0	Nil
EE3547	PC	Lab on Mobile Technology	0	0	2	1	1.0	Nil
CA3570	FW	Internship Presentation	0	0	2	1	1.0	Nil
VP3501	VAP	Value Added Program V	0	0	2	2	1.0	Nil
GP3501	GP	General Proficiency	0	0	0	1		
			6	**0**	**8**	**12**		

BCA-MAWT Specialization

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA3509	PC	iOS Application Development CAP-IV	3	0	0	3	1	Nil
CA3545	PC	iOS Application Development CAP-IV Lab	0	0	2	1	1	Nil
	PE	Program Elective I	3	0	0	3	1	Nil
	PE	Program Elective I Lab	0	0	2	1	1	Nil
		TOTAL	**12**	**0**	**12**	**20**		

Contact Hrs: 24

BCA-Normal

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA3544	PC	Advanced Python Lab	0	0	2	1	1.0	Nil
	PE	Program Elective I	3	0	0	3	1.0	Nil
	PE	Program Elective II	3	0	0	3	1.0	Nil
		TOTAL	**12**	**0**	**10**	**19**		

Contact Hrs: 22

SEMESTER 6

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA3601	PC	Intelligent Data Analytics	4	0	0	4	1.0	Nil
CA3640	PC	Project	10	0	0	10	1.0	Nil
CA3641	PC	Seminar	0	0	3	2	1.0	Nil
			14	**0**	**3**	**16**		

BCA-MAWT Specialization

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
CA3608	FC	Application Testing	3	0	2	4	1	Nil
	PE	Program Elective II	3	0	0	3	1	Nil
	PE	Program Elective II Lab	0	0	2	1	1	Nil
		TOTAL	**20**	**0**	**7**	**24**		

Contact Hrs: 27

BCA-Normal

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
MA3603	FC	Mathematics	3	0	0	3	1.0	Nil
	PE	Program Elective III	3	0	0	3	1.0	Nil
	PE	Program Elective IV	3	0	0	3	1.0	Nil
		TOTAL	**23**	**0**	**3**	**25**		

Contact Hrs: 26

PROGRAM ELECTIVES (BCA- Normal)

Elective	Course Code	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
I	CA3503	Multimedia and Animation	3	0	0	3	1.0	Nil
	CA3504	IT Infrastructure Management	3	0	0	3	1.0	Nil
	CA3507	Data Compression Techniques & Algorithms	3	0	0	3	1.0	Nil
II	CA3505	Machine Learning Concepts	3	0	0	3	1.0	Nil
	CA3506	Cloud Computing Foundation	3	0	0	3	1.0	Nil
	CA3508	IT Application Security & Privacy	3	0	0	3	1.0	Nil
III	CA3602	E-Commerce	3	0	0	3	1.0	Nil
	CA3603	Cryptography and Network Security	3	0	0	3	1.0	Nil
	CA3606	Digital Image Processing & Analysis	3	0	0	3	1.0	Nil
IV	CA3604	Introduction to Cyber Law and Crimes	3	0	0	3	1.0	Nil
	CA3605	Introduction to Mobile Application Development	3	0	0	3	1.0	Nil
	CA3607	Introduction to Computer Vision	3	0	0	3	1.0	Nil

Contact Hrs: 32

PROGRAM ELECTIVES – BCA MAWT (Specialization)

Elective	Course Code	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
I	CA3510	Cross-Platform ApplicationDevelopment	3	0	0	3	1.0	Nil
	CA3511	JavaScript Framework	3	0	0	3	1.0	Nil
	CA3546	Cross-Platform ApplicationDevelopment Lab	0	0	2	1	1.0	Nil
	CA3547	JavaScript Framework Lab	0	0	2	1	1.0	Nil
II	CA3609	Web 3.0	3	0	0	3	1.0	Nil
	CA3610	Advanced Android ApplicationDevelopment	3	0	0	3	1.0	Nil
	CA3642	Web 3.0 Lab	0	0	2	1	1.0	Nil
	CA3643	Advanced Android ApplicationDevelopment Lab	0	0	2	1	1.0	Nil

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our university.

The following is the course module designed for the B.C.A program:

Core competency: Students will acquire core competency computer application and in allied subject areas.

Program/Discipline Specific Elective Course (DSEC):

Skilled communicator: The course curriculum incorporates basics and advanced training in order to make a graduate student capable of expressing the subject through technical writing as well as through oral presentation.

Critical thinker and problem solver: The course curriculum also includes components that can be helpful to graduate students to develop critical thinking ability by way of solving problems/numerical using basic & advance knowledge and concepts of Computer Studies.

Sense of inquiry: It is expected that the course curriculum will develop an inquisitive characteristic among the students through appropriate questions, planning and reporting experimental investigation.

Skilled project manager: The course curriculum has been designed in such a manner as to enabling a graduate student to become a skilled project manager by acquiring knowledge about technical project management, writing, planning, study of ethical standards and rules and regulations pertaining to technical project operation.

Ethical awareness/reasoning: A graduate student requires understanding and developing ethical awareness/reasoning which the course curriculums adequately provide.

Lifelong learner: The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability opportunity.

Value Added Course (VAC): A value added audit course is a non-credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be four courses of Aptitude in Semester I, II, III, IV, V semesters and two courses of Soft Skills in every Semesters and will carry no credit, however, it will be compulsory for every student to pass these courses with minimum 45% marks to be eligible for the certificate. These marks will not be included in the calculation of CGPI. Students have to specifically be registered in the specific course of the respective semesters.

Skill Enhancement Course: This course may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

Generic/Open Elective Course (OEC): Open Elective is an interdisciplinary additional subject that is compulsory in a program. The score of Open Elective is counted in the overall aggregate marks under Choice Based Credit System (CBCS). Each Open Elective paper will be of 3 Credits in II, III, IV, V and IV semesters. Each student has to take Open/Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Open Electives.

Non-Credit CGPA : This is a compulsory course but audit that does not have any choice and will be of 3 credits. Each student of B.C.A Program has to compulsorily pass the Environmental Studies and Human values & professional Ethics and NSS.

C. PROGRAM OUTCOMES OF BCA.

PO-01	**Computer Science Applications knowledge**	Apply the knowledge of mathematical, science and computerprogramming to solve of computer software problems.
PO-02	**Problem analysis**	Identify, formulate, review research literature, analyze complex problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and computer software
PO-03	**Development of solutions**	Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO-04	**Modern tool usage**	Create, select, and apply appropriate techniques, resources, andmodern software development and IT tools.
PO-05	**Environment and**	Understand the impact of the professional engineering solutions in

	sustainability	societal and environmental contexts, and demonstrate the knowledgeof, and need for sustainable development.
PO-06	**Ethics**	Apply ethical principles and commit to professional ethics andresponsibilities and norms of the software development practice.
PO-07	**Individual and team work**	Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
PO-08	**Communication**	Communicate effectively on complex software programming activities with the software development community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO-09	**Life-Long learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Program Specific Outcomes:

- **PSO1**-To pursue further studies to get specialization in Computer Science and Application, Economics, Mathematics, business administration.
- **PSO2**-To pursue the career in corporate sector can opt for MBA or MCA.
- **PSO3**-To Work in the IT sector as programmer, system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.

Program Educational Objectives (PEO's)

- **PEO1.** To be well familiar with the concepts of Computer Applications for leading a successful career in industry or as entrepreneur or to pursue higher education.
- **PEO 2.** To develop techno-commercial skills for providing effective solutions to complex problems using domain knowledge of Computer Science and Applications
- **PEO 3.** To instill lifelong learning approach towards constantly evolving technologies with innovative and ethical mindset.

E. Pedagogy & Unique practices adopted:

"Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will emphasize on experiential learning:

Role Play & Simulation: Role- play and simulation are forms of experiential learning. Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings. Role-play and simulation function as learning tools for teams and groups or individuals as they "play" online or face-to-face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their explorations and the viewpoints of the character or personality they are articulating in the environment. This student-centered space can enable learner-oriented assessment, where the design of the task is created for active student learning. Therefore, role-play& simulation exercises such as virtual share trading, marketing simulation etc. are being promoted for the practical-based experiential learning of our students.

Video Based Learning (VBL) & Learning through Movies (LTM): These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through movies. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through VBL & LTM is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting VBL & LTM, wherever possible.

Field/Live Projects: The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other their regular classes.

Industrial Visits: Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

MOOCs: Students may earn credits by passing MOOCs as decided by the college. Graduate level programs may award Honors degree provided students earn pre-requisite credits through MOOCs. University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval. Keeping this in mind, University proposed and allowed a maximum of two credits to be allocated for each MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through only NPTEL could be given 2 credits for each MOOC course.

For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

a) It will necessary for every student to take at least one MOOC Course throughout the programme.

b) There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.

c) The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalize a list of courses to be offered with 2 credits defined for each course and the mode of credit consideration of the student. The complete process shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course, the approval will be valid only for the semester on offer.

d) Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.

e) After completion of MOOC course, Student will submit the photo copy of Completion certificate of MOOC Course to the Examination cell as proof.

f) Marks will be considered which is mentioned on Completion certificate of MOOC Course.

g) College will consider the credits only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.

Special Guest Lectures (SGL) & Extra Mural Lectures (EML): Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

Student Development Programs (SDP): Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

Industry Focused programmes: Establishing collaborations with various industry partners to deliver the programme on sharing basis. The specific courses are to be delivered by industry experts to provide practice-based insight to the students.

Special assistance program for slow learners & fast learners: write the note how would you identify slow learners, develop the mechanism to correcting knowledge gap. Terms of advance topics what learning challenging it will be provided to the fast learners.

Induction program: Every year 3 weeks induction program is organized for 1st year students and senior students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.

Mentoring scheme: There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.

Competitive exam preparation: Students are provided with one class in every week for GATE/ Competitive exams preparation.

Extra-curricular Activities: organizing & participation in extracurricular activities will be mandatory to help students develop confidence & face audience boldly. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.

Career & Personal Counseling: - Identifies the problem of student as early as possible and gives time to discuss their problems individually as well as with the parents. Counseling enables the students to focus on behavior and feelings with a goal to facilitate positive change. Its major role lies in giving: Advice, Help, Support, Tips, Assistance, and Guidance.

Participation in Flip Classes, Project based Learning(A2 Assignment), Workshops, Seminars & writing & Presenting Papers: Departments plan to organize the Flip Classes, Project based Learning(A2 Assignment), workshops, Seminars & Guest lecturers time to time on their respective topics as per academic calendar. Students must have to attend these programs. This participation would be count in the marks of general Discipline & General Proficiency which is the part of course scheme as non-credit course.

Formation of Student Clubs, Membership & Organizing & Participating events: Every department has the departmental clubs with the specific club's name. The entire student's activity would be performed by the club. One faculty would be the coordinator of the student clubs & students would be the members with different responsibility.

Capability Enhancement & Development Schemes: The Institute has these schemes to enhance the capability and holistic development of the students. Following measures/ initiatives are taken up from time to time for the same: Career Counseling, Soft skill development, Remedial Coaching, Bridge Course, Language Lab, Yoga and Meditation, Personal Counseling

Library Visit & Utilization of QLRC: Students may visit the library from morning 10 AM to evening 8 PM. Library created its resources Database and provided Online Public Access Catalogue (OPAC) through which users can be accessed from any of the computer connected in the LAN can know the status of the book. Now we are in process to move from OPAC to KOHA.

Detailed Syllabus (Semester wise /course wise)

SEMESTER 1 Year -1

CA 3107	Title: C Programming	L T P C 3 1 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To learn the fundamentals of computers .To understand the various steps in Program development .To learn to write programs using structured programming approach in C to solve problems.	
Expected Outcome	Upon completion of the course, the student should be able to Effectively and creatively solve a wide range of graphic design problems. Form effective and compelling interactive experiences for a wide range of audiences. Demonstrate the basic knowledge of Gain knowledge in using C language for solving problems.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit 1	Basics of Computer	7
History and Hardware – Computer Hardware, Bits and Bytes, Components, Programming Languages – Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software.		
Unit 2	Fundamental of C Programming	7
Introduction to C Programming- Identifiers, The main () Function, The printf () Function Programming Style – Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associatively, Declaration Statements, Initialization. Assignment – Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.		
Unit 3	Control Flow and Looping	7
Control Flow-Relational Expressions – Logical Operators: Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples. Repetition: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.		
Unit 4	Functions and Arrays	8
Modular Programming: Function and Parameter Declarations, Returning a Value, Local, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function. **Arrays & Strings:** One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices Strings: String Fundamentals, String Input and Output, String Processing, Library Functions.		
Unit 5	Pointer, Structure and File Handling	7
Pointers, Structures, Files : Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments. Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures,		
Text Books	1. KR Venugopal,."Mastering C",TMH 2. Y. kanetkar "Let us C" ,BPB Publication 3. E. Balagurusamy.."Programming in ANSI C" TMH	
Reference Books	1. Dennis Ritchie The C Programming Language" TMH	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studies on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA 3101

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	understand the concept of hardware , software, and programming languages- low level & high level and OOPs concept.	2	S
CO2	understand the fundamentals of C programming like data types, operator and its precedence, associativity formatted outputs etc.	2	S
CO3	understand and implement the concept of control flowand looping.	2	Emp
CO4	understand and implement the concept of functions and arrays.	3	Emp
CO5	understand and implement the concept of pointer structure and file handling and apply these for real worldproblems.	3	Emp

CO-PO Mapping for CA 3101

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	1	2	1	1	2	2	2	2	2	2
CO 2	2	3	2	3	1	2	2	2	2	2	2	2
CO 3	3	2	1	2	1	2	1	2	2	2	2	2
CO 4	3	3	3	2	1	2	2	2	2	2	2	2
CO 5	2	3	3	2	2	3	2	3	3	3	3	3
Avg	2.6	2.6	2	2.2	1.2	2	1.8	2.2	2.2	2.2	2.2	2.2

CA 3102	Title: Discrete Mathematics	L T P C 3 2 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	Write an argument using logical notation and determine if the argument is or is not valid. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.	
Expected Outcome	A number of recurring themes, and a set of general principles that have broad application to the field of computer science and discrete mathematics . The social, legal, ethical, and cultural issues inherent in the discipline of computing .	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit 1	Introduction	6
Variables, The Language of Sets, The Language of Relations and Function Set Theory: Definitions and the Element Method of Proof, Properties of Sets, Disproofs, Algebraic Proofs, Boolean Algebras, Russell's Paradox and the Halting Problem		
Unit 2	Logic, Quantified Statements, Functions	7
The Logic of Compound Statements: Logical Form and Logical Equivalence, Conditional Statements, Valid and Invalid Arguments: Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, Cardinality with Applications to Computability		
Unit 3	Number Theory and Methods of Proof	8
Elementary Number Theory and Methods of Proof: Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, Floor and Ceiling, Indirect Argument: Contradiction and Contraposition, Two Classical Theorems, Applications in algorithms		
Unit 4	Relations, Graph & Tree	7
Relations: Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations Graphs and Trees: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism's of Graphs, Trees, Rooted Trees, Isomorphism's of Graphs, Spanning trees and shortest Paths		
Unit 5	Counting and Probability	8
Counting and Probability: Introduction, Possibility Trees and the Multiplication Rule, Possibility Trees and the Multiplication Rule, Counting Elements of Disjoint Sets: The Addition Rule, The Pigeonhole Principle, Counting Subsets of a Set: Combinations, Combinations with Repetition Allowed, Probability Axioms and Expected Value, Conditional Probability, Bayes' Formula, and Independent Events		
Text Books	1. Sussana S. Epp, Discrete Mathematics with Applications, Cengage Learning 2. Seymour Lipschutz ,Discrete Mathematics, Schaum's Outlines Series , Marc Lipson, Tata MCGraw Hill	
Reference Books	1. Kenneth H. Rosen , Discrete Mathematics and its Applications, Tata MCGraw Hill 2 B Kolman RC Busby, S Ross, Discrete mathematical structures, PHI	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA 3102

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to understand the concepts of set along with proofs to prove equality in sets. Various operations on sets, Principle of inclusion and exclusion, and various properties of Relation.	2	S
CO2	Students should be able to understand propositions and then would be able to find out the validity of the argument.	2	Emp
CO3	Students should be able to get complete knowledge of number theory, induction and various operations on integers.	2	S
CO4	Students should be able to understand the concepts of Graphs, Trees and related theorems along with various related algorithms. They will also learn Relation concepts and properties	3	Emp
CO5	Students should be able to solve the problems of Permutation, Probability and Combination. They will learn the concepts of counting theory and techniques.	2	Emp

CO-PO Mapping for CA 3102

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PEO1	PEO1	PEO1	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	3	3	2	3	2	3	2	3	2	2	3
CO 2	3	3	3	3	2	3	2	2	2	3	2	1
CO 3	3	3	2	3	2	2	3	3	3	3	2	2
CO 4	2	2	3	2	2	3	3	2	3	2	3	2
CO 5	3	2	3	3	1	1	3	2	3	3	2	3
Avg	2.8	2.6	2.8	2.6	2	2.2	2.8	2.2	2.8	2.6	2.2	2.2

PS 3101	Title: Human Values & Ethics	L T P C 2 0 0 2
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	To facilitate the development of a holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the human reality and the rest of existence	
Expected Outcome	This course will make the students aware and sensitive to value systems in real life situations. It will help them to discriminate between ephemeral and eternal value and to discriminate between essence and form	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Introduction of Value Education	5
1. Understanding the need, basic guidelines, content and process of Value Education 2. A look at basic Human Aspirations: Self Exploration–its content and process		
Unit II	Understanding Harmony - Harmony in Myself!	5
1. Thoughtful human being in harmony; as a co-existence of the sentient, attitude and its importance in relationship. 2. Understanding the needs, characteristics and activities of Self ('I')		
Unit III	Understanding Harmony in the Family and Society	5
1. Harmony in the family; values in human relationships; meaning of Nyaya , Trust (Vishwas) and Respect (Samman) as the foundation values of relationships. 2. Harmony in society:Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals.		
Unit IV	Understanding Harmony in the Nature and Existence	4
1. Understanding the harmony in Nature: Interconnectedness among the four orders of nature- recyclability and self-regulation in nature 2. Natural perception of harmony at all levels of existence		
Unit V	Understanding Professional Ethics	5
Competencies in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, c) Ability to identify and develop appropriate technologies and management patterns for aboveproduction systems.		
Text Books	1.R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi,	
Reference Books	1.A.N. Tripathy , Human Values, New Age International Publishers. 2.B L Bajpai,, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. B P Banerjee, Foundations of Ethics and Management, Excel Books	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	08-08-2022	
Date of approval by the Academic Council	20-10-2022	

Course Outcome for PS 3101

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society	2	S
CO2	Students should be able to Distinguish between the Self and the Body, understand the meaning ofHarmony in the Self the Co-existence of Self and Body.	2	S
CO3	Students should be able to understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society.	3	Emp
CO4	Students should be able to understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.	2	Emp
CO5	Students should be able to distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.	2	S

CO-PO Mapping for PS 3101

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	2	2	3	3	1	3	3	2
CO 2	1	2	3	2	3	2	2	1	3	2	2	2
CO 3	2	2	2	3	2	3	3	3	2	1	3	2
CO 4	2	3	2	2	2	3	2	3	3	3	3	3
CO 5	3	2	3	3	2	2	2	2	3	2	2	2
Avg	2.2	2.2	2.4	2.4	2.2	2.4	2.4	2.4	2.4	2.2	2.6	2.2

CA 3104	Title: Open source software and Linux	L T P C 3 2 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	The Community's goal is that Open Office becomes the product of choice for users of office software, on any major platform in any language. However, it is recognized that office suites are a mature product, and so users with a product currently installed on their PCs will probably be quite comfortable with it.	
Expected Outcome	OpenOffice.org adopted a development guideline that future versions of OpenOffice.org would run on free implementations of Java.	
Unit No.	Unit Title	No. of Hrs
Unit 1	Introduction To LINUX	7
What Is Linux? -The Problems with Windows -The Benefits of Linux – Proprietary Software and the GPL- GNU and Linux Together- Different Flavors of Linux- Who Uses Linux?- Understanding How Linux Differs from Windows- Using Ubuntu		
Unit 2	Bash Shell	7
What Is the BASH Shell? -Working with Files-Listing Files-Copying Files and Directories -Moving Files and Directories -Deleting Files and Directories –Changing and Creating Directories-Real Files and Virtual Files. -Users and File Permissions - The File System Explained -File Searches -Using the find Command -Using the locate Command -Using the where is Command-File Size and Free Space –Viewing File Sizes -Finding Out the Amount of Free Space		
Unit 3	Writer — The Word Processor	7
Creating a Document -Opening a Document -Laying Out the Page-Setting paper size, margins, and orientation -Creating headers and footers -Numbering pages –Entering and Editing Text-Modifying text-Moving and copying text -Finding and replacing text - Correcting mistakes automatically-Printing -Adding character to your characters - Planning Your Paragraphs-Aligning paragraphs -Spacing your lines -Making Lists - Bulleting lists-Numbering lists-Using a style -Creating a style - tables and columns		
Unit 4	CALC — The Spreadsheet	7
Creating a Spreadsheet -Inputting Your Data -Entering your data -Editing your data - Filling cells automatically -Managing Columns and Rows-Copying, pasting, cutting, dragging, and dropping your cells -Adding the Art -Formula Basics-Adding, Subtracting, and More -Adding and other arithmetic -Adding with the Sum function -Rocketing into Orbit with Functions Using the Auto Pilot: Functions dialog box –Editing functions -Entering functions manually -Copying and pasting formulas –Creating formula arrays		
Unit 5	IMPRESS — THE PRESENTATION	8
Creating a Presentation -Opening an existing presentation -Adding Slides –Adding text to a slide -Saving Your Presentation for Posterity - Making Presentations Picture Perfect -Adding Images -Clipping art -Drawing objects -Coloring Backgrounds - Creating a plain-colored background -Creating a gradient background -Hatching a background -Using a bitmap image as a background -Creating 3-D text-Inserting 3-D objects -Animating Impressively -Using Text Effects Effectively -Creating Animation Effects		

Text Books	1. Keir Thomas and Andy Channelle with Jaime Sicam , "Beginning Ubuntu Linux" , Apress 2. GurdyLeete, Ellen Finkelstein, and Mary Leete, "Openoffice.org for dummies", Wiley Publishing, Inc
Reference Books	1.OpenOffice.org BASIC Programming Guide, Andrew Pitonyak's Macro Book
Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3142

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	Students should be able to use open-source software like Libre office	2	S
CO2	Students should be able to use various Linux command	2	Emp
CO3	Students should be able to use MS word software	2	S

CO-PO Mapping for CA 3142

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	3	3	2	2	3	1	3	2	3
CO 2	3	1	1	2	2	3	2	2	3	1	3	2
CO 3	2	3	3	1	2	2	2	2	3	2	2	2
Avg	2.3	2.3	2.0	2.0	2.3	2.3	2.0	2.3	2.3	2.0	2.3	2.3

CA3144	Title: C Programming Lab	L T P C 0 0 2 2
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	Learning objectives is to improve confidence in technology use and increased awareness of opportunities afforded to individuals with computer application skills.	
Expected Outcome	To learn and practice the basic concept of C language	

List of Experiments

1. Programs using I/O statements and expressions.
2. . Programs using decision-making constructs.
3. Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
4. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Check whether a given number is Armstrong number or not?
6. Populate an array with height of persons and find how many persons are above the average height.
7. Populate a two dimensional array with height and weight of persons and compute the Body Mass Index of the individuals.
8. Given a string —a$bcd./fg| find its reverse without changing the position of special characters. (Example input:a@gh%;j and output:j@hg%;a)
9. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
10. From a given paragraph perform the following using built-in functions:
    a. Find the total number of words.
    b. Capitalize the first word of each sentence.
    c. Replace a given word with another word.
11. Solve towers of Hanoi using recursion.
12. Sort the list of numbers using pass by reference.
13. Generate salary slip of employees using structures and pointers.
14. Compute internal marks of students for five different subjects using structures and functions.
15. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3141

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to learn a programming language.	2	S
CO2	Students should be able to learn problem solving techniques.	3	Emp
CO3	Students should be able to write programs in C and to solve the problems.	2	Emp

CO-PO Mapping for CA3141

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	3	2	3	1	2	2	2	3	3	2
CO 2	3	3	2	3	2	2	2	2	2	2	2	1
CO 3	2	2	2	1	2	3	3	3	3	2	3	3
Avg	2.67	2.33	2.33	2.00	2.33	2.00	2.33	2.33	2.33	2.33	2.67	2.00

CA3143	Title:Open Source Software and Linux Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	Learn about the accessibility features available within the Open Office suite of applications and how to customize them	
Expected Outcome	• Students should be able to use open sourse software like Libre office • Students should be able to use various Linux command • Students should be able to use MS word software	

List of Experiments

1. Installation of Linux using Virtual Box
2. Installation of Open Source software in Linux OS.
3. Executing Shell level basic commands.
4. Create files and apply permissions on files using terminal.
5. Download unformatted file "prax-en.txt" and Open downloaded file, save your file in Open Office format
6. Apply paragraph Style "Text Body" & Modify paragraph style "Text Body"
7. Format chapter headings, Activate chapter numbering, Mark chapter headings
8. Format first page & Insert new page after title page
9. Insert table of contents & Modify table of contents, Format table of contents
10. Insert new page after table of contents & Add page numbering
11. Prepare style First page, Apply style First Page, Prepare style Default Page

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	14-05-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3142

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to use open-source software like Libre office	2	S
CO2	Students should be able to use various Linux command	2	Emp
CO3	Students should be able to use MS word software	2	S

CO-PO Mapping for CA 3142

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	0	2	0	0	0	2	0	2	2	2	2
CO 2	1	0	1	0	0	0	2	0	2	2	2	2
CO 3	2	0	2	0	0	0	2	0	2	2	2	2
Avg	1.25	0	1.25	0	0	0	1.5	0	1.5	1.5	1.5	1.5

CE 3102	Title: Disaster Preparedness & Management	L T P C 2 0 0 2
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	The course is intended to provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery.	
Expected Outcome	• Student should be able understand the concept and type of disaster • Student should be able to understand classification, causes and impact of disaster • Student should be able to understand approaches of disaster risk reduction • Student should be able to understand inter-relationship between disasters and development: • Student should be able to understand disaster risk management in India	
Unit No.	Unit Title	No. of hours (per Unit)
Unit: 1	Introduction to Disasters:	5
Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)		
Unit II	Disasters: Classification, Causes, Impacts	4
(including social, economic, political, environmental, health, psychosocial, etc.) Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasteis!urban disasters, pandemics, complex emergencies, Climate change		
Unit III	Approaches to Disaster Risk reduction	5
Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural nesures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders..		
Unit IV	Inter-relationship between Disasters and Development:	5
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources		
Unit V	Disaster Risk Management in India	5
Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)		
Text Books	1. Bhattacharya, Disaster Science and Management, McGraw Hill Education Pvt. Ltd.	
Reference Books	1. Dr. Mrinalini Pandey, Disaster Management, Wiley India Pvt. Ltd. 2. Jagbir Singh, Disaster Management: Future Challenges and Opportunities, K W Publishers Pvt. Ltd.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	08-08-2022	
Date of approval by the Academic Council	20-10-2022	

Course Outcome for CE 3102

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Understand the basic concepts of disasters and its relationships with development.	2	S
CO2	Understand the approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.	2	S
CO3	Understand the Medical and Psycho-Social Response to Disasters.	2	S
CO4	Prevent and control Public Health consequences of Disasters.	2	S
CO5	Awareness of Disaster Risk Management institutional processes in India.	2	S

CO-PO Mapping for CE 3102

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	1	2	1	1	2	2	2	2	2	2
CO 2	2	3	2	3	1	2	2	2	2	2	2	2
CO 3	3	2	1	2	1	2	1	2	2	2	2	2
CO 4	3	3	3	2	1	2	2	2	2	2	2	2
CO 5	2	3	3	2	2	3	2	3	3	3	3	3
Avg	2.6	2.6	2	2.2	1.2	2	1.8	2.2	2.2	2.2	2.2	2.2

SEMESTER 2 Year -1

CA 3204	Title: Software Engineering	L T P C 3 1 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To understand the best practices in software engineering and to develop the necessary skills to handle software projects in a principled way.	
Expected Outcome	After the completion of this course, the students will be able to understand the ways of Software Development, Designing & Testing.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to Software Engineering	8
Introduction to Software Engineering, Software Characteristics, Software Crisis, Software Engineering Processes, Software Development Life Cycle (SDLC) Models, Software Myths		
Unit II	Software Requirements Definition	7
The software requirements specifications (SRS), formal specifications techniques, characteristics of a good SRS, SQA		
Unit III	Software Design and Implementation Issue	7
Fundamental design, concept design notations, design techniques, structured coding techniques coding styles, documentation guidelines.		
Unit IV	Fundamental of Software Testing	7
What is Testing, Testing Approaches, Testing Principles, Testing Challenges ,Types of Testing		
Unit V	Software Maintenance	7
Software Maintenance Overview, Cost of Maintenance, Software Re- Engineering, Reverse Engineering, Software Maintenance		
Text Books	1. Software Engineering – A Practitioner's Approach by RS Pressman, Tata McGraw Hill Publishers, New Delhi 2. Software Engineering by Rajib Mall, PHI Publishers, New Delhi	
Reference Books	1. In Integrated Approach to Software Engineering By PankajJalote, Narosa Publication House 2. Software Engineering ,Sangeetasabarwal ,New Age International , New Delhi	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	08-08-2022	
Date of approval by the Academic Council	20-10-2022	

Course Outcome for CA 3204

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Understand about Software Engineering and SDLC (Software development life cycle).	2	S
CO2	Understand about the SRS and Characteristics of SRS	2	S
CO3	Understand about various software designing techniques and implementation issues.	2	Emp
CO4	Understand about the different types of software testing techniques	3	Emp
CO5	Understand about the software maintenance	3	Emp

CO-PO Mapping for CA 3204

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	1	1	2	3	2	2	2	2	2	3
CO 2	2	1	2	1	3	2	1	3	2	1	3	1
CO 3	2	2	2	2	1	3	3	2	2	2	2	2
CO 4	3	3	3	2	2	2	2	2	3	3	2	3
CO 5	3	3	3	3	3	2	3	2	3	3	2	3
Avg	2.4	2.2	2.2	1.8	2.2	2.4	2.2	2.2	2.4	2.2	2.2	2.4

CA 3205	Title: Fundamentals of Data Structures	L T P C 3 1 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To introduce the basics of C programming language To introduce the concepts of ADTs and linear data structures .To introduce the concepts of Sorting and Searching techniques. To familiarize the concepts of Hashing and Sets	
Expected Outcome	Upon completion of the course, the student should be able to: Implement data structures using C language. Solve the problem using linear and non linear data structures.Analyze and implement hashing techniques that solves in linear time.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit 1	Introduction	11
Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT) Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations. Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition, Generalized Linked List.		
Unit 2	Stack	9
Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.		
Unit 3	Trees	9
Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.		
Unit 4	Graphs	9
Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transistive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Introduction to Activity Networks.		
Unit 5	Searching	10
Searching : Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting. Search Trees: Binary Search Trees(BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees . Hashing: Hash Function, Collision Resolution Strategies Storage Management: Garbage Collection and Compaction.		
Text Books	1. Aaron M. Tenenbaum,YedidyahLangsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India.	
Reference Books	1. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India. 2. A.K. Sharma ,Data Structure Using C, Pearson Education India. 3. Rajesh K. Shukla, "Data Structure Using C and C++" Wiley Dreamtech Publication.	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	

Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA 3205

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to explain the data structures and its various types. Different operations to be studied wrt arrays and linked list.	2	S
CO2	Students should be able to explain and implement stacks and queues and their various operations .	2	Emp
CO3	Students should be able to explain and implement trees and its types with their traversals.	3	Emp
CO4	Students should be able to explain and implement graphs ,trees and also various graph matrices and understand the concept of graph traversals.	3	Emp
CO5	Students should be able to analyze and study various search algorithms.	3	Emp

CO-PO Mapping for CA 3205

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	2	2	3	3	3	2	3	2	2	2
CO 2	2	3	3	3	1	2	3	3	2	2	2	2
CO 3	3	3	3	3	2	2	3	2	3	3	1	3
CO 4	3	2	2	2	3	3	2	3	3	2	3	3
CO 5	3	3	3	3	2	2	3	2	2	3	3	3
Avg	2.6	2.6	2.6	2.6	2.2	2.4	2.8	2.4	2.6	2.4	2.2	2.6

CA 3244	Title: Data Structures Using Advance C Lab	L T P C 0 0 4 2
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	To develop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures .	
Expected Outcome	• Students should be able to learn about data structures like array, stack, queues and linked list. • Students should be able to Learn about how to insertion, deletion and traversing operations on data structures. • Students should be able to Learn about how to Compare various searching and sorting techniques.	

List of Experiments

1. Write a C program to implement Stack using an array.
2. Write a C program to implement Queue using an array.
3. Write a C program to implement the following using a singly linked list a. Stack ADT b. Queue ADT.
4. Write a C Program to Implement Linear Search algorithm.
5. Write a C program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree.
6. Write a C program that use recursive functions to traverse the given binary tree in a) Preorder b) In order and c) Postorder.
7. Write C programs for the implementation of BFS and DFS for a given graph.
8. Write C programs for implementing the following sorting methods: a) Merge Sort b) Heap Sort.
9. Write a C program to perform the following operations. a) Insertion into a B-tree b) Deletion from a B-tree.
10. Write a C Program to implement all the functions of Dictionary (ADT) using hashing.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA3244

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to learn about data structures like array, stack, queues and linked list.	2	Emp
CO2	Students should be able to Learn about how to insertion, deletion and traversing operations on data structures.	3	Emp
CO3	Students should be able to Learn about how to Compare various searching and sorting techniques.	3	S

CO-PO Mapping for CA 3244

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	3	1	2	2	2	1	1	2
CO 2	2	2	2	3	2	2	2	2	2	2	2	1
CO 3	3	2	2	3	3	2	3	3	2	2	2	2
Avg	2	2	2	2	2	1.25	1.75	1.75	1.5	1.25	1.25	1.25

HU 3202	Title: United Nations Development Program	L T P C 1 0 0 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives		
Unit Nos.	Unit Title	Number of hours (Per Unit)
Unit 1	Introduction	2
Introduction to UNDP, Mission and Vision of UNDP, Goals of UNDP, Structure of UNDP Executive Board and function of UNDP Board members, Expertise of UNDP, UNDP in India: Projects of UNDP in India.		
Unit 2	Sustainable Livelihoods	3
Vision and Strategy for Sustainable Livelihoods: Hill Agriculture / Horticulture, Tourism and Other avenues for generating Sustainable Livelihoods. Strategies for End of hunger, achieve food security and improved nutrition and promote sustainable agriculture Promote Sustained, Inclusive and Sustainable Economic Growth, Full and Productive Employment and Decent Work for All. Build Resilient Infrastructure, Promote Inclusive and Sustainable Industrialization and Foster Innovation		
Unit 3	Human Development	2
Access and explore human development data for 191 countries and territories worldwide. Ensure healthy lives and promote well-being for all at all ages, Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities, Ensure availability and sustainable management of water and sanitation.		
Unit 4	Social Development	2
Achieve Gender Equality and Empower All Women and Girls, Reduce Inequality within and Among Countries, Promote Peaceful and Inclusive Societies for Sustainable Development, Provide Access to Justice to All and Build Effective, Accountable and Inclusive Institutions at All Levels		
Unit 5	Environmental Sustainability	3
Ensure access to affordable, reliable, sustainable and modern energy, Make Cities and Human Settlements Inclusive, Safe, Resilient and Sustainable, Ensure Sustainable Consumption and Production Patterns, Urgent Action to Combat Climate Change and its Impacts, Protect, Restore and Promote Sustainable Use of Terrestrial Ecosystems, Sustainably Manage Forests, Combat Desertification, and Halt and Reverse Land Degradation and Halt Biodiversity Loss.		
Text Books		
Reference Books	http://web.undp.org/evaluation/documents/Books/Evaluation_for_Agenda_2030.pdf Digambar Bhouraskar, 2014, United Nations Development Aid: A History of Undp, Academic Foundation Publisher, 230	
Mode of Evaluation	Internal and External Examination	
Recommended by the Board of Studies on	08-08-2022	
Date of approval by the Academic Council on	20-10-2022	

Course Outcome for HU 3202

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp.)/ Skill(S)/ Entrepreneurship (Ent.)/ None (*Use , for more than One*)
CO1	Students will learn about the Structure, Mission, Vision and Goals of UNDP	2	S
CO2	Equip the students with the knowledge of sustainable livelihoods for inclusive economic growth.	2	S
CO3	Students will learn and explore about the Human Development index to promote well being at all ages.	2	S
CO4	To impart better education on SDGs goals focusing on Gender Equality and Provide Access to Justice to All and Build Effective.	3	N
CO5	Students will develop knowledge regarding environment sustainability.	3	N

CO-PO Mapping for HU 3202

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	3	2	3	2	2	2	3	2
CO 2	3	2	2	1	2	2	3	2	2	2	2	2
CO 3	3	2	2	2	2	2	2	2	2	3	2	2
CO 4	2	3	2	2	2	3	2	3	2	2	3	2
CO 5	3	2	2	3	2	1	2	2	2	2	2	3
Avg	2.8	2.2	2.0	2.0	2.2	2.0	2.4	2.2	2.0	2.2	2.4	2.2

MA 3209	Title: Mathematics- II	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• To develop the capability among students for handling abstract concepts and to provide the students with experience in axiomatic mathematics while keeping in close touch with the computational aspects of the subject.	
Expected Outcome	• Execute fundamental mathematical proofs and ability to verify. • Apply basic counting techniques to solve combinatorial problems. • Comprehend formal logical arguments and expression of mathematical properties formally via the formal language of propositional logic and predicate logic. • Analyse and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess. • Formulate computer programs (e.g. recursive functions) using mathematical principle.	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Set theory and Relations	09
Introduction theorems on sets, sets and elements, Venn diagrams, set operations, algebra of sets, duality, classes of sets, power sets, real vector spaces and subspaces null spaces, dimension of vector spaces, column spaces, geometrical vectors in a plane, vectors in a Cartesian plane, scalar multiplications, Euclidean inner product of two vectors, application of dot and scalar multiplications, vectors in three dimensional spaces, cross product in three dimension, relations and its properties, order relations, Hasse diagrams.		
Unit II	Functions and Algorithms	09
Introduction to functions and algorithms, functions and types of functions, interjections and surjections, bijections and inverse functions, One-to-One, Onto, invertible functions, mathematical, exponential and logarithmic functions, sequences and indexed classes of sets, recursively defined functions, cardinality, data base: functional dependence and normal forms, algorithms and functions, complexity of algorithms.		
Unit III	Counting Techniques	09
Introduction to counting, basics of counting, pigeon hole principles, permutations and combinations, generalized permutations and combinations, generating permutations and combinations, basics of discrete probability theory, recurrence relations, solving recurrence relations, divide and conquer relations, generating functions, inclusion and exclusion, application of inclusion and exclusion.		
Unit IV	Graph Theory	09
Introduction to graphs, varieties of graphs and graph models, graph operations, special graph and graph family, representation and computations, attributes of graph models, directed graph: path, cycles and connectedness, orientations, acyclic graphs, distance, connectivity and traversability, graph invariance and isomorphism types, graph and map coloring, planer drawings, enumerating graphs, algebraic graph theory, analytic graph theory, hyper graphs, application of graph theory, rooted trees, sorting, searching strategies, weighted graphs.		
Unit V	Tree	09

Introduction to trees, characterization and types of trees, properties of tree, roots and orderings, tree traversal, infinite trees, spanning trees, Depth-first and breadth-first spanning trees, enumeration of spanning trees, enumerating trees : counting generic trees, counting trees in computer science.	
Text Books	1. Discrete Mathematics for New Technology, Second Edition - Rowan Garnier, John Taylor, Institute of Physics Publishing Bristol and Philadelphia. 2. Theory and Problems of Discrete Mathematics, Third Edition - SEYMOUR LIPSCHUTZ, MARC LARS LIPSON, Schaum's Outline Series, McGRAW-HILL
Reference Books	• Hand book of Discrete and Combinatorial Mathematics - KENNETH H. ROSEN, JOHN G. MICHAELS, JONATHAN L. GROSS, JERROLD W. GROSSMAN, DOUGLAS R SHIER, CRC Press. • Linear Algebra and Matrix Analysis for Statistics – Sudipto Banerjee, Anindya Roy, CRC Press. • Linear Algebra concepts and methods – Martin Anthony, Michele Harvey, Cambridge University Press.
Mode of Evaluation	Internal and External
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for MA 3209

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Execute fundamental mathematical proofs and ability to verify.	2	S
CO2	Apply basic counting techniques to solve combinatorial problems.	2	Emp
CO3	Comprehend formal logical arguments and expression of mathematical properties formally via the formal language of propositional logic and predicate logic.	2	Emp
CO4	Analyse and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess.	2	S
CO5	Formulate computer programs (e.g. recursive functions) using mathematical principle.	1	Emp

CO-PO Mapping for MA 3209

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	3	2	3	2	2	2	3	2
CO 2	3	2	2	1	2	2	3	2	2	2	2	2
CO 3	3	2	2	2	2	2	2	2	2	3	2	2
CO 4	2	3	2	2	2	3	2	3	2	2	3	2
CO 5	3	2	2	3	2	1	2	2	2	2	2	3
Avg	2.8	2.2	2.0	2.0	2.2	2.0	2.4	2.2	2.0	2.2	2.4	2.2

CA 3209	Title: Object Oriented Programming with Java	L T P C 2 0 0 2
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• To familiarize students with object-oriented programming language and software platform that runs on any kind of device, including notebook computers, mobile devices, gaming consoles, medical devices, and many others.	
Expected Outcome	• Explain how Java provides support for principles of object oriented-programming and the Java • Development Environment • Explain the Java basic constructs and control structures and Packages • Design and develop application for information storage and exchange using input/output and sockets. • Build applications that have an event-driven graphical user interface using the standard Java libraries.	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Introduction to Object Oriented Programming	06
Introduction to Unit, Classes and Objects, Object Oriented Programming Concepts, Access Specifiers and Access Modifiers, Introduction to Java, Java Virtual Machine, Conclusion of the Unit.		
Unit II	Basic Java Programming	06
Introduction to Unit, Variables, Data Types, Control flow statements – if, else, switch, for, while, Arrays, Strings, Conclusion of the Unit		
Unit III	Java Packages and Interfaces	06
Introduction to Unit, Java classes, Java methods, Packages, Interfaces, Java.util, java.io, java.net, java.sql, java.applet, Collection Framework, Generics, Wrapper classes, Conclusion of the Unit		
Unit IV	Exceptions and I/O Handling	6
Introduction to Unit, Errors and Exceptions, Exception handling, Streams, Readers and Writers, Programming with Files, Multithreaded programming, Networking – Socket Programming, Conclusion of the Unit		
Unit V	User Interface and Advanced Concepts	6
Introduction to Unit, User Interface Components, AWT, Swing, Event Handling, Layouts, Forms, Applets, Annotations, Conclusion of the Unit.		
Text Books	1. The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.	
Reference Books	• SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.	
Mode of Evaluation	Internal and External	
Recommendation by Board of Studies on	08-08-2022	
Date of approval by the Academic Council	20-10-2022	

Course Outcome for CA 3209

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Explain how Java provides support for principles of object oriented-programming and the Java	2	S
CO2	Development Environment explanation	2	Emp
CO3	Explain the Java basic constructs and control structures and Packages	2	Emp
CO4	Design and develop application for information storage and exchange using input/output and sockets.	2	S
CO5	Build applications that have an event-driven graphical user interface using the standard Java libraries.	1	Emp

CO-PO Mapping for CA 3209

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	3	2	3	2	2	2	3	2
CO 2	3	2	2	1	2	2	3	2	2	2	2	2
CO 3	3	2	2	2	2	2	2	2	2	3	2	2
CO 4	2	3	2	2	2	3	2	3	2	2	3	2
CO 5	3	2	2	3	2	1	2	2	2	2	2	3
Avg	2.8	2.2	2.0	2.0	2.2	2.0	2.4	2.2	2.0	2.2	2.4	2.2

EG 3210	Title: Communicative English	L T P C 2 1 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• To familiarise the students with the broad areas of communicative English	
Expected Outcome	• To know the working principles of a computer. • To understand the basic terminology used in computer programming • To write, compile and debug programs in C language. • To design programs using decision structures, loops and functions. • To understand the dynamics of memory by the use of pointers and Structures.	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Communication in Business	09
Introduction, Communication Process, Essentials of Business Communication, Barriers to Business Communication.		
Unit II	Types of Communication	09
Verbal Communication, Nonverbal Communication, Types of Communication Based on Style and Purpose		
Unit III	Reading Skills-I	09
Parts of Speech (Nouns, Pronouns, Adjectives, Verbs, Adverbs, Prepositions, Conjunctions, and Interjections)		
Unit IV	Reading Skills-II	09
Sentences, Subject-Verb Agreement, Active and Passive Voice, Direct and Indirect Speech		
Unit V	Communication in Organisation	09
Types of Communication, Meetings, Memo, Circulars and Notices. Business Correspondence: General Rules for All Business Correspondence, Guidelines for the Basic Cover Letter, Guidelines for Information Interviewing, Networking Letters, Guidelines for Thank You Letters, Guidelines for Job Offer, Acceptance Letters, Guidelines for Letters Declining a Job Offer, Style in Business Correspondence Business Report Writing: Cover Letters, Business Report Writing, The purpose of statistical studies, a sample of business correspondence		
Text Books	1. Bhatia, R.C., Business Communication, New Delhi: Ane Books Pvt Ltd 2. Scot, O., Contemporary Business Communication, New Delhi: Biztnatra	
Reference Books	• Parikh, J.P. et al, Business Communication: Basic Concepts and Skills, Hyderabad: Orient Blackswan	
Mode of Evaluation	Internal and External	
Recommendation by Board of Studies on	08-08-2022	
Date of approval by the Academic Council	20-10-2022	

Course Outcome for EG3210

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	To know the working principles of a computer.	2	S
CO2	To understand the basic terminology used in computer programming	2	Emp
CO3	To write, compile and debug programs in C language.	2	Emp
CO4	To design programs using decision structures, loops and functions.	2	S
CO5	To understand the dynamics of memory by the use of pointers and Structures.	1	Emp

Course Outcome for EG 3210

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Explain how Java provides support for principles of object oriented-programming and the Java	2	S
CO2	Development Environment explanation	2	Emp
CO3	Explain the Java basic constructs and control structures and Packages	2	Emp
CO4	Design and develop application for information storage and exchange using input/output and sockets.	2	S
CO5	Build applications that have an event-driven graphical user interface using the standard Java libraries.	1	Emp

CA 3211	Title: Foundation Course-CAP (Mobile Application)	L T P C 2 0 0 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• To familiarize the students with the foundation of MobileApplications and different mobile operating.	
Expected Outcome	• Explain the different concepts needed for the proper functioning of amobile device. • Identify different types of applications, the importance of mobileoperating system and features of the same. • Develop Simple Mobile Application using App inventor	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Introduction	10
Introduction to Mobile devices and applications, Brief history of Mobile technology, Cellular technology and the Mobile Ecosystem, Types of Mobile Applications, Mobile Information Architecture, Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device environment and Requirements		
Unit II	Mobile operating systems and applications	10
Introduction to Mobile Applications, Components of a Mobile Application, Introduction to Mobile Operating Systems - Basics of Android and IOS, Introduction to Mobile device components - Processors, Memory, Sensors, Input and output. Working of Android Apps, Introduction to android studio, Development Tools, Publishing Tools and Developer Program, Monetization.		
Unit III	Simple mobile app development using App Inventor	10
Introduction to MIT App Inventor. Adding components and buttons, Code blocks, using emulator, event handler, method calls, getting and setting properties, Using numbers and math operations, Boolean and logical operators, Variables, loops and other constructs.		
Text Books	1. Mobile Networks Architecture by Andre Perez, Wiley, March 2012 2. Mobile Handset Design by Sajal K. Das, John Wiley and Sons, 2010	
Reference Books	• Professional Mobile Application Development by Jeff McWherter, Scott Gowell, 2012	
Mode of Evaluation	Internal and External	
Recommendation by Board ofStudies on	08-08-2022	
Date of approval by theAcademic Council	20-10-2022	

Course Outcome for CA 3211

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Explain the different concepts needed for the proper functioning of a mobile device.	2	S
CO2	Identify different types of applications, the importance of mobile operating system and features of the same.	2	Emp
CO3	Develop Simple Mobile Application using App inventor	2	Emp

CO-PO Mapping for CA 3211

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	3	3	2	2	3	1	3	2	3
CO 2	3	1	1	2	2	3	2	2	3	1	3	2
CO 3	2	3	3	1	2	2	2	2	3	2	2	2
Avg	2.3	2.3	2.0	2.0	2.3	2.3	2.0	2.3	2.3	2.0	2.3	2.3

CA 3213	Title: Critical Thinking & Multi-Cultural Competencies.	L T P C 2 0 0 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• To familiarize the students with the broad areas of critical thinking.	
Expected Outcome	• Recognize critical thinking as a process of identifying, analysing, evaluating, and constructing • reasoning in deciding what conclusions to draw • Demonstrate an increased ability to explain an issue or problem comprehensively • Illustrate an enhanced ability to employ evidence/information in conducting a comprehensive • analysis of an issue or problem • Construct a logically sound and well-reasoned argument about an issue/problem • Distinguish relevant from non-relevant data, fact from opinion	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Introduction and Overview of Multi- cultural Competencies	15
Cultural Competence: Definitions- Models of Cultural Competence - Pedersen's Conceptual Framework for Developing Cultural and Cross-Cultural Competence- Awareness Domain Competencies- Race as a Construct Related to Cultural Competence- Ethnicity as a Construct Related to Competence- Culture as a Construct Related to Competence - Dimensions of Personal Identity - Worldview as a Construct Related to Cultural Competence - Recognizing and Responding to Oppression as a Form of Cultural Competency- Recognizing and Responding to Racism as a Form of Cultural Competency		
Unit II	Knowledge Competency	15
Knowledge Competencies- Racial Identity Models- Cross' Racial Identity Development Model- White Racial Identity Development Model- Sue and Sue's Racial/Cultural Identity Development Model- Culturally Distinct Groups - Some Caveats- Strategies for Developing Cultural Competence - Skills Competencies- Integrating Awareness and Knowledge as a Form of Cultural Competence- Addressing Classroom Climate as a Form of Cultural Competence - Cultural Continuity as a Multicultural Competence - Enlisting Cultural Informants as a Cultural Competence - Seeing Students Holistically as a Cultural Competence		
Unit III	Introduction to Critical Thinking	15
• What is Critical thinking? Paul Elder Critical Thinking Framework, Improving thinking skills, Cognitive Reflection Test • Determine Information, Rational Claims and Emotional Claims, Facts and Opinion, Recognising pieces of evidence, Spot deception and holes in the arguments, Presentation of the data, Logical Flaws in arguments		
Unit IV	Dealing with Arguments	15
• Contradictory, inadequate or ambiguous information, cogent argument, supporting data • Over rated conclusion, holes in the evidence, interpreting texts and contexts, repose other options • Articulation of argument, using evidence to defend the argument, logical and cohesive organization of the argument, Extraneous elements, Ordering of evidence into a persuasive argument		

Text Books	• T Martin Davies and Ronald Barnett (2015) The Palgrave Handbook of Critical Thinking in Higher Education Palgrave. • Cross-Cultural Competence for Glocal Success- Prof Vikas Silodkar
Reference Books	• Dörner, D. (1997). The logic of failure. Recognizing and avoiding errors in complex situations. New York: Basic Books. • Handbook of Multicultural Competencies in Counseling and Psychology
Mode of Evaluation	Internal and External
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3213

Unit-wise Course Outcome	**Descriptions**	**BL Level**	**Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)**
CO1	Recognize critical thinking as a process of identifying, analysing, evaluating, and constructing	2	S
CO2	reasoning in deciding what conclusions to draw	2	Emp
CO3	Demonstrate an increased ability to explain an issue or problem comprehensively	2	Emp
CO4	Illustrate an enhanced ability to employ evidence/information in conducting a comprehensive	2	S

CO-PO Mapping for CA 3213

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3

CA 3247	Title: Object Oriented Programming with Java Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• To familiarize students with object-oriented programming language and software platform that runs on any kind of device, including notebook computers, mobile devices, gaming consoles, medical devices, and many others.	
Expected Outcome	• Explain how Java provides support for principles of object oriented-programming and the Java • Development Environment • Explain the Java basic constructs and control structures and Packages • Design and develop application for information storage and exchange using input/output and sockets. • Build applications that have an event-driven graphical user interface using the standard Java libraries.	

Lab Experiments:

1. A program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write aWrite program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.

Text Books	• The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.
Reference Books	• SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education
Mode of Evaluation	Internal and External
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3247

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Explain how Java provides support for principles of object oriented-programming and the Java	2	S
CO2	Development Environment	2	Emp
CO3	Explain the Java basic constructs and control structures and Packages	2	Emp
CO4	Design and develop application for information storage and exchange using input/output and sockets.	2	S
CO5	Build applications that have an event-driven graphical user interface using the standard Java libraries.	1	Emp

CO-PO Mapping for CA 3247

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3
CO 5	2	2	2	3	3	2	1	2	3	3	2	2
Avg	2.8	2.0	2.4	2.2	2.0	2.4	2.0	2.4	2.6	2.8	2.2	2.4

CE 3102	Title: Disaster Preparedness & Management	L T P C 2 0 0 2
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	The course is intended to provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery.	
Expected Outcome	• Student should be able understand the concept and type of disaster • Student should be able to understand classification, causes and impact of disaster • Student should be able to understand approaches of disaster risk reduction • Student should be able to understand inter-relationship between disasters and development: • Student should be able to understand disaster risk management in India	
Unit No.	Unit Title	No. of hours (per Unit)
Unit: 1	Introduction to Disasters:	5
Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)		
Unit II	Disasters: Classification, Causes, Impacts	4
(including social, economic, political, environmental, health, psychosocial, etc.) Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasteis!urban disasters, pandemics, complex emergencies, Climate change		
Unit III	Approaches to Disaster Risk reduction	5
Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural nesures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders..		
Unit IV	Inter-relationship between Disasters and Development:	5
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources		
Unit V	Disaster Risk Management in India	5
Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)		
Text Books	2. Bhattacharya, Disaster Science and Management, McGraw Hill Education Pvt. Ltd.	
Reference Books	3. Dr. Mrinalini Pandey, Disaster Management, Wiley India Pvt. Ltd. 4. Jagbir Singh, Disaster Management: Future Challenges and Opportunities, K W Publishers Pvt. Ltd.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	08-08-2022	
Date of approval by the Academic Council	20-10-2022	

Course Outcome for CE 3102

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Understand the basic concepts of disasters and its relationships with development.	2	S
CO2	Understand the approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.	2	S
CO3	Understand the Medical and Psycho-Social Response to Disasters.	2	S
CO4	Prevent and control Public Health consequences of Disasters.	2	S
CO5	Awareness of Disaster Risk Management institutional processes in India.	2	S

CO-PO Mapping for CE 3102

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	1	2	1	1	2	2	2	2	2	2
CO 2	2	3	2	3	1	2	2	2	2	2	2	2
CO 3	3	2	1	2	1	2	1	2	2	2	2	2
CO 4	3	3	3	2	1	2	2	2	2	2	2	2
CO 5	2	3	3	2	2	3	2	3	3	3	3	3
Avg	2.6	2.6	2	2.2	1.2	2	1.8	2.2	2.2	2.2	2.2	2.2

BCA-Normal

CA3206	Title: Object Oriented Programming Using C++	L T P C 3 1 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	This course provides an introduction to object-oriented programming (OOP) using the Java programming language. Its main objective is to teach the basic concepts and techniques which form the object-oriented programming paradigm.	
Expected Outcome	Students who complete the course will have demonstrated the ability to do the model of object-oriented programming: abstract data types, encapsulation, inheritance and polymorphism.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit 1	Introduction	8
What is object oriented programming? Why do we need object oriented. Programming characteristics of object-oriented languages C and C++. C++ Programming basics: Output using Cout. Directives. Input with cin. Type bool. The setw manipulator. Type conversions.		
Unit 2	Functions	12
Returning values from functions. Reference arguments. Overloaded function. Inline function. Default arguments. Returning by reference. **Object and Classes:** Making sense of core object concepts (Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces) Implementation of class in C++, C++ Objects as physical object, C++ object as data types constructor. Object as function arguments. The default copy constructor, returning object from function. Structures and classes. Classes objects and memory static class data. Const and classes.		
Unit 3	Arrays and string arrays fundamentals	9
Arrays of object, string, The standard C++ String class **Operator overloading:** Overloading unary operations. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable.		
Unit 4	Inheritance	9
Concept of inheritance. Derived class and based class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation: Classes within classes, inheritance and program development.		
Unit 5	Pointer & Virtual Function	10
Addresses and pointers. The address of operator and pointer and arrays. Pointer and Faction pointer and C-types string. Memory management: New and Delete, pointers to objects, debugging pointers. Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, dynamic type information.		
Text Books	Herbert Schildt: The Complete Reference C++, Tata McGraw Hill, .	
Reference Books	1. Robert Lafore ,Object Oriented Programming in C++ , Techmedia Publication. 2. Saurav Sahay, Object Oriented Programming in C++ Oxford University Press.	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA 3206

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to understand the basics of Object-Oriented programming. Learn the programming basics of C++.	2	S
CO2	Students should be able to understand the concept of Classes, Objects, Polymorphism, Inheritance using C++.	2	Emp
CO3	Students should be able to understand the fundamentals of Arrays and Strings using C++.	2	Emp
CO4	Students should be able to understand and implement the concept of Inheritance using C++.	3	S
CO5	Students should be able to apply the concept of pointer and virtual function in complex programming situations.	3	Emp

CO-PO Mapping for CA 3206

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	2	3	2	2	2	3	2	2	2	2
CO 2	2	1	2	1	3	3	2	2	2	2	2	2
CO 3	2	2	2	3	2	1	2	2	2	3	3	2
CO 4	2	3	3	2	2	2	2	3	2	2	2	2
CO 5	3	3	3	2	2	2	3	2	3	3	3	3
Avg	2.2	2.2	2.4	2.2	2.2	2	2.2	2.4	2.2	2.4	2.4	2.2

CA 3243	Title: Object Oriented Programming Using C++ Lab	L T P C 0 0 4 2
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	To make students able to learn basics of object oriented programming.,Students will learn to write program using classes and objects. Students will try to implement basic oops features using C++ programming.	
Expected Outcome	• Student should be able to implement the concept of oops. • Student should be able to use class and object in c++. • Student should be able to test different strings for their comparision	

List of Experiments

1. Using the concept of function overloading Write function for calculating the area of triangle, circle and rectangle.
2. Write a function power to raise a number m to power n. The function takes a double value for m andin value for n. Use default value for n to make the function to calculate squares when this argument is omitted.
3. Create a class TIME with members hours, minutes, and seconds. Take input, add two time objects passing objects to function and display result.
4. Write a program for multiplication of two matrices using OOP.
5. Create a class Student which has data members as name, branch, roll no, age, sex, marks in five subjects.
6. Display the name of the student and his percentage who has more than 70%.Use array of objects.
7. Write a program to enter any number and find its factorial using constructor.
8. Write a program to perform addition of two complex numbers using constructor overloading. The first constructor which takes no argument is used to create objects which are not initialized, second which takes one argument is used to initialize real and imaginary parts to equal values and third which takes two argument is used to initialized real and imaginary to two different values.
9. Write a program to generate a Fibonacci series using copy constructor.
10. Write a program to demonstrate the use of friend function with Inline assignment.
11. Write a program to find the greatest of two given numbers in two different classes using friend function.
12. Write a program to find the sum of two numbers declared in a class and display the numbers and sum using friend class.
13. Create a class person and two drive classes employee and students, inherited from class person. Now create a class manager which is derived from two base classes employee and students. Show the use of virtual base class.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022

Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3243

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Student should be able to implement the concept of oops.	2	Emp
CO2	Student should be able to use class and object in c++.	3	Emp
CO3	Student should be able to test different strings for their comparision	3	S

CO-PO Mapping for CA 3243

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes			Program Educational Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PEO 1	PEO 2	PEO 3
CO 1	3	2	2	2	3	1	2	2	2	1	1	2	2	2	2
CO 2	2	2	2	3	2	2	2	2	2	2	2	1	2	2	2
CO 3	3	2	2	3	3	2	3	3	2	2	2	2	2	2	3
Avg	2	2	2	2	2	1.25	1.75	1.75	1.5	1.25	1.25	1.25	2	2	2.33

CA 3242	Title: Hardware Maintenance Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The main objective of the Lab is to provide the students the knowledge of computer hardware , the processors , memories, motherboard, different add on cards and other peripherals devices. Most important objective is to impart knowledge about the trouble-shooting and fault finding the computers and the peripherals	
Expected Outcome	On Completion of this course, students are able to develop skills to impart practical knowledge in real time solution. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.	

List of Experiments

1. Different hardware components of a computer and their troubleshooting.
2. Different peripherals, their performance and cost characteristics.
3. Installation of different operating system and their capabilities
4. Installation of commonly used software like jdk, netbeans , turbo c, code block etc.
5. Networking, network topologies, and installation of LAN.
6. To study about SMPS.
7. To study about UPS.
8. To study about Motherboard of computer.

Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA 3242

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Understand about the different hardware components of an computer and troubleshooting of computer.	2	S
CO2	Able to install different types of operating system and application software.	2	S
CO3	Understand about the SMPS, UPS , Motherboard etc.	2	S

CO-PO Mapping for CA 3242

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	3	2	3	3	2	2	2	3	2	2
CO 2	2	3	2	3	2	2	2	2	2	2	2	3
CO 3	3	2	2	3	3	2	3	3	2	2	2	2
Avg	2.7	2.3	2.3	2.7	2.7	2.3	2.3	2.3	2.0	2.3	2.0	2.3

SEMESTER 3 Year -2

CA 3305	Title: Relational Database Management	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	The student should be made to distinguish between different models of organizing,storing and use of data,to apply specific SQL statement on relational tables as per requirements	
Expected Outcome	• Students should be able to understand about the database,database management system and comparison between DBMS and file oriented. • Students should be able to understand and design about RDBMS, EFCodd rules and mapping of ER diagrams. • Student should be able understand about database normalization and itsworking with SQL • Students should be able to understand about object modelling anddatabase designing. • Students should be able to understand about transactions processing andvarious concurrency control techniques.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction- Database And Database ManagementSystems	10
History of Database Management Systems, Characteristics of DBMS, Meaning and Definition of Database objectives of database, advantages of database and disadvantages of traditional file environment systems, Designing Databases-Hierarchical Data model- Network Data model- and Relational Data models-Database trends, Introduction to Relational Algebra		
Unit II	Relational Database [RDBMS]	9
Relational Database [RDBMS]: The Relational Database Model-Techniques Components of Relational Model-Definition of Relational Terms- Features of RDBMS CODD 12 rules for a fully RDBMS. Relational implementation Primary and Foreign Keys- Relationships in the relational model Introduction to ER Model- one-to-one, one to- many, many to many relationship- Examples of Data definition language		
Unit III	Normalization and SQL	10
Queries - Maintaining Integrity-Defining Data Integrity- Integrity Rules- Relational Integrity Rules- Referential Integrity- Entity Integrity- Domain Integrity- Entity Integrity User-defined Integrity- Integrity Constraints- Domain Constraints- Normalization -Benefits of normalization- Functional Dependency and Determinants, Canonical cover, Introduction to Normalization-INF, 2NF, 3NF, Review of Normal Forms-Structured Language Query [SQL]- Characteristics of SQL. Types of SQL [DCL- DDL- DML]- Basic queries in SQL Single table-Multi table Retrievals- Nested queries - Deletion- Insertion- and Update in SQL.		
Unit IV	Object Modeling and Database Design	10

Introduction- Types of Data Models (Conceptual Logical and Physical Data modeling)- Model Development- Attributes of Modeling-ER model- the object-oriented model- record based models- physical data models- Stages of Data modeling- Modeling Three Schema Architecture- Entity Relationship [ER] model Entities Attributes and Relation [EAR] models- Entity Relationship Diagrams		
Unit V	**Transaction and Concurrency Control Techniques**	**9**
Transaction system, Testing of serializability, Serializability of schedules. deadlock handling, Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, working with oracle rdbms		
Text Books	1 Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill 2 Elmasri, Navathe, "Fundamentals Of Database Systems", AddisionWesley,5th edition	
Reference Books	1. Date C J, "An Introduction To Database System", Pearson, Bipin C. Desai,"An introduction to Database Systems", Galgotia Publication 2. Leon & Leon, "Database Management System", Vikas Publishing House. 3. Majumdar& Bhattacharya, "Database Management System", TMH.	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board ofStudied on	08-08-2022	
Date of Approval by theAcademic Council on	20-10-2022	

Course Outcome for CA 3305

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to understand about the database, database management system and comparison between DBMS and file oriented.	2	S
CO2	Students should be able to understand and design about RDBMS, EF Codd rules and mapping of ER diagrams.	2	Emp
CO3	Student should be able understand about database normalization and its working with SQL	2	Emp
CO4	Students should be able to understand about object modelling and database designing.	2	S
CO5	Students should be able to understand about transactions processing and various concurrency control techniques.	2	Emp

CO-PO Mapping for CA 3305

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	1	2	3	2	2	2	2	2	2	2
CO 2	3	3	2	2	3	1	3	2	2	3	2	3
CO 3	3	3	3	3	2	2	2	2	3	3	3	3
CO 4	3	3	3	3	2	2	2	3	3	2	2	3
CO 5	2	2	2	2	1	3	3	2	2	2	2	2
Avg	2.6	2.6	2.2	2.4	2.2	2.0	2.4	2.2	2.4	2.4	2.2	2.6

CA 3304	Title: Operating System	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	General understanding of structure of modern computers purpose, structure andfunctions of operating systems illustration of key OS aspects by example	
Expected Outcome	• Student should be able to understand about SystemSoftware and overviewof operating systems • Student should be able to understand the concepts of Process Manage-ment functions and Deadlocks differential Calculus • Student should be able to understand the concepts of memory manage-ment Function • Student should be able to understand the concepts of I/O Management Functions • Student should be able to understand the concepts of File Management by operating system	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction	7
Functions of Operating System, Evolution of Operating System, Batch, Interactive, Time Sharing and Real Time System, System Protection. Operating System Structure: System Components, System Structure, Operating System Services. Multiprocessor Operating System concept, Distributed Operating Systems concept:- Introduction – Issues		
Unit II	Process Management	7
Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Critical Section, Problem, Semaphores, Classical Problems in Concurrency, Inter- Process Communication, Process Generation, Process Scheduling.		
Unit III	CPU Scheduling	7
Scheduling Concept, Performance Criteria, Scheduling Algorithms, Multiprocessor Scheduling. Deadlocks: System Model, Deadlock Characterization, Prevention, Avoidance and Detection, Recovery from Deadlock, Distributed scheduling		
Unit IV	Memory Management	8
Basic Machine, Resident Monitor, Multiprogramming with Fixed Partition, Multiprogramming with Variable Partition, Multiple Base Register, Paging, Segmentation, Paged Segmentation, Virtual Memory Concept, Demand Paging, Performance, Page Replacement Algorithms, Allocation of Frames, Thrashing, Cache Memory Organization, Impact on Performance.		
Unit V	File Management	7
I/O Management & Disk Scheduling: I/O Devices and Organization of I/O Function, I/O Buffering, Disk I/O, Operating System Design Issues. File System: File Concept, File Organization and Access Mechanism, File Directories, File Sharing, Implementation Issues. Distributed File systems concept, Distributed Shared Memory concept		

Text Books	1. Silverschatz, Peterson J, "Operating System Concepts", Willey. 2. Milenekovic, "Operating System Concept", McGraw Hill.
Reference Books	1. Petersons, "Operating Systems", Addision Wesley. 2. Dietal, "An Introduction to Operating System", Addision Wesley. 3. Tannenbaum, "Operating System Design and Implementation", PHI.
Mode of Evaluation	Internal and External Examinations
Recommended by Board ofStudied on	08-08-2022
Date of Approval by theAcademic Council on	20-10-2022

Course Outcome for CA 3304

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Understand about the operating system and types of operating system.	2	S
CO2	Understand the concepts of process management with various concurrency control techniques.	2	Emp
CO3	learn and implement the various CPU scheduling algo's and how dead lock occurs and how to preventit.	3	Emp
CO4	Understand the concepts and implementation of Memory management policies and virtual memory.	2	Emp
CO5	Understand the working of file management how data is stored into memory and how it will transmit fromone side to another in computer system.	2	S

CO-PO Mapping for CA 3304

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	1	2	3	1	2	2	2	2	2	2
CO 2	2	3	2	3	2	2	3	2	2	2	2	2
CO 3	3	2	1	2	3	2	1	2	2	2	2	2
CO 4	3	3	3	2	1	2	2	2	2	2	2	2
CO 5	2	3	3	2	2	3	2	3	3	3	3	3
Avg	2.6	2.6	2.0	2.2	2.2	2	2.0	2.2	2.2	2.2	2.2	2.2

CA 3341	Title: Relational Database Management Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools. to familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented frame work, to give a good formal foundation on the relational model of data, to present SQL and procedural interfaces to SQL comprehensively	
Expected Outcome	• student should be able to write and execute DDL commands • student should be able to write and execute DML command • student should be able to write and execute DCL command	

List of Experiments

1. Study of DBMS, RDBMS and ORDBMS.
2. To study Data Definition language Statements.
3. To study Data Manipulation Statements.
4. Study of SELECT command with different clauses.
5. Study of SINGLE ROW functions (character, numeric,Data functions).
6. Study of GROUP functions (avg, count, max, min,Sum).
7. Study of various type of SET OPERATORS (Union, Intersect, Minus).
8. Study of various type of Integrity Constraints.
9. Study of Various type of JOINS.
10. Study of nested queries.
11. Study of various integrity constraints.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3341

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	student should be able to write and execute DDL commands	3	S
CO2	student should be able to write and execute DML command	3	S
CO3	student should be able to write and execute DCL command	3	S

CO-PO Mapping for CA 3341

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	3	2	3	3	3	3	1	3	1
CO 2	2	3	3	2	2	1	2	3	2	2	2	3
CO 3	3	2	2	3	2	2	3	2	2	3	2	2
Avg	2.7	2.3	2.3	2.7	2.0	2.0	2.7	2.7	2.3	2.0	2.3	2.0

CA 3342	Title: Python Programming Lab	L T P C 0 0 4 2
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The learning objectives of this course are to understand why Python is a useful scripting language for developers to design and program Python applications and how they can implement lists, tuples, and dictionaries in Python programs. and also able to implement all basic functionalities of python.	
Expected Outcome	• Student Should be able to Write, Test and Debug Python Programs • Student Should be able to Implement Conditionals and Loops for Python Programs • Student Should be able to Lists,Tuples and Dictionaries	

List of Experiments

1. Python Programming Syntax and Special Data Types with Example.
2. Python Program to build calculator to perform basic operations.
3. Python Program to demonstrate slicing with all types .
4. Write a python program to implement Flow control (if-else/ ladder if else).
5. Write Python Program to show the working of different types of loops (For, while) also explain the use of arange().
6. Write a python program to check whether a number is palindrome or not.
7. Write a Python Program to demonstrate all type of List and dictionary inbuilt functions.
8. Write Python Program to print factorial of number using Function.
9. Write Python Program to show the use of function inside function and closure function.
10. Write a Python Program to design a GUI Interface using ,Entry, Label and menu.

Mode of Evaluation	Internal and External Examinations
Recommendation	08-08-2022
Date of approval by theAcademic Council	20-10-2022

Course Outcome for CA 3342

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	understand basic principles of Python programming language	2	S
CO2	Implement object oriented concepts	2	Emp
CO3	Implement database and GUI applications.	2	Emp

CO-PO Mapping for CA 3342

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	3	2	3	3	3	3	1	3	1
CO 2	2	3	3	2	2	1	2	3	2	2	2	3
CO 3	3	2	2	3	2	2	3	2	2	3	2	2
Avg	2.7	2.3	2.3	2.7	2.0	2.0	2.7	2.7	2.3	2.0	2.3	2.0

HU 3201	**Title: Indian Knowledge System**	**L T P C** **1 0 0 1**
Version No.	**1.0**	
Course Prerequisites	Nil	
Objectives		
Unit Nos.	**Unit Title**	**Number of hours (Per Unit)**
Unit 1	**Overview of IKS**	2
Survey of IKS Domains: A broad overview of disciplines included in the IKS, and historical developments. Sources of IKS knowledge, classification of IKS texts, a survey of available primary texts, translated primary texts, and secondary resource materials. Differences between a sutra, bhashya, karika, and vartika texts. Fourteen/eighteen vidyasthanas, tantrayukti		
Unit 2	**Vocabulary of IKS**	2
Introduction to Panchamahabhutas, concept of a sutra, introduction to the concepts of non-translatable (Ex. dharma, punya, aatma, karma, yagna, shakti, varna, jaati, moksha,loka, daana, itihaasa, puraana etc.) and importance of using the proper terminology. Terms such as praja, janata, loktantra, prajatantra, ganatantra, swarjya, surajya, rashtra, desh,		
Unit 3	**Philosophical foundations and Methods of IKS**	3
Philosophical foundations of IKS: Introduction to Samkhya, vaisheshika and Nyaya Methods in IKS: Introduction to the concept of building and testing hypothesis using the methods of tantrayukti. Introduction to pramanas and their validity, upapatti; Standards of argumentation in the vada traditions (introduction to concepts of vaada, samvaada, vivaada, jalpa, vitanda). Concept of poorvapaksha, uttarapaksha		
Unit 4	**Case Studies**	2
• Mathematics of Madhava, Nilakantha Somayaji • Astronomical models of Aryabhata • Wootz steel, Aranumula Mirrors, and lost wax process for bronze castings • Foundational aspects of Ayurveda • Foundational aspects of Ashtanga yoga • Foundational aspects of Sangeeta and Natya shastra		
Unit 5	**India and the World**	3
Influence of IKS on the world, knowledge exchanges with other classical civilizations, and inter-civilizational exchanges.		
Text Books		
Reference Books	• An Introduction to Indian Knowledge Systems: Concepts and Applications, B Mahadevan, V R Bhat, and Nagendra Pavana R N; 2022 (Prentice Hall of India). • Indian Knowledge Systems: Vol I and II, Kapil Kapoor and A K Singh; 2005 (D.K. Print World Ltd). • The Beautiful Tree: Indigenous India Education in the Eighteenth Century, Dharampal, Biblia Impex, New Delhi, 1983. Reprinted by Keerthi Publishing House Pvt Ltd., Coimbatore, 1995. • Indian Science and Technology in the Eighteenth Century, Dharampal. Delhi: Impex India, 1971. The British Journal for the History of Science. • The Wonder That Was India, Arthur Llewellyn Basham, 1954, Sidgwick& Jackson. • The India they saw series (foreigner visitors on India in history from 5CE to 17th century), Ed. Meenakshi Jain and Sandhya Jain, Prabhat Prakashan	
Mode of Evaluation	Internal and External Examination	
Recommended by the Board of Studies on	08-08-2022	
Date of approval by the Academic Council on	20-10-2022	

Course Outcome for HU 3201

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp.)/ Skill(S)/ Entrepreneurship (Ent.)/ None (*Use , for more than One*)
CO1	The students will be able to understand the Indian Knowledge System such as historical development, sources and scope.	2	S
CO2	The students will be able to understand the vocabulary system of Indian knowledge system.	2	S
CO3	The students will be able to understand and apply the philosophical foundations and methods of IKS.	3	N
CO4	The students will be able to execute the case studies based on the Indian knowledge system.	3	N
CO5	The students will be able to understand the influence of Indian Knowledge System on world.	2	S

CO-PO Mapping for HU 3201

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	1	2	1	2	3	1	2	2	2	3	3	3
CO 2	2	3	2	3	2	2	3	2	2	2	2	3
CO 3	3	2	1	2	3	2	1	2	2	2	3	2
CO 4	3	3	3	2	1	2	2	2	2	2	2	2
CO 5	2	3	3	2	2	3	2	3	3	3	3	3
Avg	2.2	2.6	2.0	2.2	2.2	2	2.0	2.2	2.2	2.4	2.6	2.6

BCA-MAWT Specialization

CA 3306	Title: Web Programming -CAP-II	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	• Demonstrate principles of creating an effective web page,including an in-depth consideration of information architecture. • Become familiar with graphic design principles that relate to webdesign and learn how to implement theories into practice. • Develop skills in analyzing the usability of a web site. • Understand how to plan and conduct user research related to web usability. • Learn the language of the web: HTML and CSS. • Create CSS grid layout and flexbox and techniques of responsiveweb design, including media queries. • Apply basic programming skills using Javascript and jQuery.	
Expected Outcome	• Create a well-designed and well-formed, professional Web site utilizing the most current standards and practices • Demonstrate knowledge in web technologies including HTML, XHTML, CSS, image-editing software, web authoring software, and client-side scripting • Create client-side scripts to add interactivity to Web pages • Analyze appropriate HTML, CSS, and JavaScript code from public repositories of open-source and free scripts that enhances the experience of site visitors. • Implement JavaScript code that works in all major browsers (including IE, Mozilla-based browsers such as Firefox, Opera, Konqueror, Safari, Chrome).	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to Internet	7
Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture		
Unit II	Introduction to World Wide Web	10
Evolution of Web, Static and Dynamic Web Sites, Web Applications, Web Development Technologies - HTML, CSS, JS, XML; Protocols - HTTP, secure HTTP, etc; URL, Web Browser, Web Server, Web Services		
Unit III	HTML	10
Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images		
Unit IV	CSS	9
Introduction to CSS, Syntax, Selectors, Embedding CSS to Html, Formatting fonts, Text & background color, Inline styles, External and Internal Style Sheets, Borders & boxing		
Unit V	XML	9
Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML Parser, Document Object Model (DOM), XML DOM.		
Text Books	1. Kogent Learning Solutions Inc., "Web Technologies - HTML, JavaScript,	

	PHP, Java, JSP, ASP.NET, XML and Ajax, Black Book"Dreamtech Press . 2. Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow, " HTML, XHTML & CSS", Wiley Publishing Inc, 2010
Reference Books	1. Steven Holzner, " HTML Black Book" Paraglyph prise 2. Jon Duckett, " Web Design with HTML, CSS, JavaScript and jQuery Set", Wiley India Pvt Ltd
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA 3306

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Create a well-designed and well-formed, professional Website utilizing the most current standards and practices	2	Emp
CO2	Demonstrate knowledge in web technologies including HTML, XHTML, CSS, image-editing software, web authoring software, and client-side scripting	2	Ent
CO3	Create client-side scripts to add interactivity to Web pages	2	S
CO4	Analyze appropriate HTML, CSS, and JavaScript code from public repositories of open-source and free scripts that enhances the experience of site visitors.	3	Emp
CO5	Implement JavaScript code that works in all major browsers (including IE, Mozilla-based browsers such as Firefox, Opera, Konqueror, Safari, Chrome).	3	Emp

CO-PO Mapping for CA 3306

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3
CO 5	2	2	2	3	3	2	1	2	3	3	2	2
Avg	2.8	2.0	2.4	2.2	2.0	2.4	2.0	2.4	2.6	2.8	2.2	2.4

CA 3307	Title: Python Programming	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To understand the history and development of Python Programming Language. • To understand the data structures and looping concepts in Python Programming Language. • To understand the important packages and functions in Python Programming Language. • To understand the importance of Python Programming Language in data wranglingor munging. • To understand the impact of Python Programming Language in statistical analysis.	
Expected Outcome	• Understand the core programming concepts of Python Programming Language. • Know the Looping and condition statements in Python Programming Language • Understand the different options in Data Management in Python Programming Language. • Understand the importance of data transformation and its need in Python Programming Language • Understand the core programming concepts of Python Programming Language.	

Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to Python Environment	9
History and development of Python, Why Python? Grasping Python's core philosophy, Discovering present and future development goals, Working with Python : Getting a taste of the language, Understanding the need for indentation, Working at the command line or in the IDE, Visualizing Power, Using the Python Ecosystem for Data Science, Accessing scientific tools using SciPy, Performing fundamental scientific computing using NumPy, Performing data analysis using pandas, Implementing machine learning using Scikit-learn, Plotting the data using matplotlib, Parsing HTML documents using Beautiful Soup, Setting Up Python for Data Science, Getting Continuum Analytics Anaconda, Getting Enthought Canopy Express, Getting pythonxy, Getting WinPython, Installing Anaconda on Windows, Linux and MAC		
Unit II	Data Structures, Looping and Branching	9
Working with Numbers and Logic, Performing variable assignments, Doing arithmetic, Comparing data using Boolean expressions, Creating and Using Strings, Interacting with Dates, Creating and Using Functions, Calling functions in a variety of ways, Using Conditional and Loop Statements, Making decisions using the if statement, Choosing between multiple options using nested decisions, Performing repetitive tasks using for, Using the while statement, Storing Data Using Sets, Lists, and Tuples : Performing operations on sets, Working with lists, Creating and using Tuples, Defining Useful Iterators, Indexing Data Using Dictionaries.		
Unit III	Data Management	9

Working with Real Data, Working with Real Data, Uploading small amounts of data into memory, Streaming large amounts of data into memory, Sampling data, Accessing Data in Structured Flat-File Form, Sending Data in Unstructured File Form, Managing Data from Relational Databases, Interacting with Data from NoSQL Databases, Accessing Data from the Web, Juggling between NumPy and pandas, Validating Your Data, Removing duplicates, Manipulating Categorical Variables, Dealing with Dates in Your Data, Dealing with Missing Data, Slicing and Dicing: Filtering and Selecting Data, Concatenating and Transforming Working with HTML Pages, Working with Raw Text, Working with Graph Data.		
Unit IV	**Data Transformation**	**9**
Understanding classes in Scikit-learn, Playing with Scikit-learn, Defining applications for data science, Performing the Hashing Trick, Using hash functions, Demonstrating the hashing trick, Working with deterministic selection, Considering Timing and Performance, Benchmarking with timeit, Working with the memory profiler, Performing multicore parallelism, Demonstrating multiprocessing.		
Unit V	**Python For Statistics**	**9**
Exploring Data Analysis, The EDA Approach, Defining Descriptive Statistics for Numeric Data, Measuring central tendency, Measuring variance and range, Working with percentiles, Defining measures of normality, Counting for Categorical Data, Understanding frequencies, Creating contingency tables, Creating Applied Visualization for EDA, Inspecting boxplots, Performing t-tests after boxplots, Observing parallel coordinates, Graphing distributions, Plotting scatterplots, Using covariance and correlation, Using nonparametric correlation, Considering chi-square for tables, Using the normal distribution, Creating a Z-score standardization, Transforming other notable distributions, Detecting Outliers in Data, Clustering, Reducing dimensionality.		

Text Books	1. Python for Data Science for Dummies - Luca Massaron and John Paul Mueller, John Wiley & Sons, Inc. 2. Python for Probability, Statistics, and Machine Learning, First Edition - José Unpingco, Springer
Reference Books	1. Python for Data Analysis - Wes McKinney, O'Reilly Media, Inc. 2. Python for Dummies - Stef Maruch and Aahz Maruch, John Wiley & Sons, Inc.
Mode of Evaluation	Internal and External Examination
Recommended by Boardof Studied on	08-08-2022
Date of Approval by theAcademic Council on	20-10-2022

Course Outcome for CA3307

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Understand the core programming concepts of Python Programming Language.	2	S
CO2	Apply the Looping and condition statements in Python Programming Language	2	Emp
CO3	Analyze the different options in Data Management in Python Programming Language.	2	Emp
CO4	Evaluate the importance of data transformation and its need in Python Programming Language	2	S
CO5	Develop elementary to advanced statistical methods in Python Programming environment.	1	Emp

CO-PO Mapping for CA3307

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3
CO 5	2	2	2	3	3	2	1	2	3	3	2	2
Avg	2.8	2.0	2.4	2.2	2.0	2.4	2.0	2.4	2.6	2.8	2.2	2.4

CA 3343	Title: Web Programming -CAP-II Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	Students have to implement the concepts of the courses to design a team project to demonstrate their knowledge acquired and skill developed. Each student has to complete the below listed experiments as a part of student-readiness for the project undertaken.	
Expected Outcome	• Create a well-designed and well-formed, professional Web site utilizing th practices • Demonstrate knowledge in web technologies including HTML, XHTML, web authoring software, and client-side scripting • Create client-side scripts to add interactivity to Web pages	

List of Experiments

1. Design a simple web page with head, body and footer, with heading tags, image tag
2. Design a website for book information, the home page should contain a books list, when a particular book is clicked, information of the books should display in the next page.
3. Design a page to display the product information such as name, brand, price and etc with table tag
4. Design a website for book information using frames, home page should contain two parts, left part should contain books list, and right part should contain book information.
5. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements.
6. Design a web page with nice formatting like background image, text colors and border for text using external CSS.
7. Design a web page to perform mathematical calculations such as addition, subtraction, multiplication, and division
8. Design a web page to read data from an XML file and display the data in tabular format, take the data as employee information.
9. Design a website for online purchase using CSS, JS and XML, web site should contain the following web pages.
    a. Home page
    b. Login page
    c. Signup page
    d. Product details page
10. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements and display them into other pages using Javascript.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CS3347

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Create a well-designed and well-formed, professional Web site utilizing the most current standards and practices	2	Emp
CO2	Demonstrate knowledge in web technologies including HTML, XHTML, CSS, image-editing software, web authoring software, and client-side scripting	2	Emp
CO3	Create client-side scripts to add interactivity to Web pages	2	Emp

CO-PO Outcome for CS3347

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	3	3	2	2	3	1	3	2	3
CO 2	3	1	1	2	2	3	2	2	3	1	3	2
CO 3	2	3	3	1	2	2	2	2	3	2	2	2
Avg	2.3	2.3	2.0	2.0	2.3	2.3	2.0	2.3	2.3	2.0	2.3	2.3

BCA-Normal

CA 3301	Title: Programming in Java	L T P C 3 2 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	The main objective of this course is to provide a straight forward way for the students to get their minds around Java and object-oriented programming. It also helps the students to get hands on experience on Java and to develop the cross platform applicat ions. This course covers all the necessary topics that any students require to create an application in Java.	
Expected Outcome	• Student shoul be able to understand the basics of Java, JDK, JVM, JRE and get to understand the OOPs concepts. • Studentsshould be able to create class, object, constructor, packages and polymorphism. • Students should be able to understand and implement the collection, framework, map, vector. • Students should be able to understand and implement exception handling and file handling. • Students should be able to understand Applet, AWT and Swing Programming.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction of Java	11
An Introduction to Java: Java Platform, Buzzwords, Short History on Java, Installing JDK, Setting the PATH. Fundamental Programming Structures: A Simple Java program, Data Types, Variables, Operators, Control Flow, Arrays, Objects and Classes: Introduction to Object Oriented Programming, Defining Your Own class, Introducing Methods, Method Overloading, Constructors, Argument Passing Mechanism, Object Destruction and Finalize, Understanding static.		
Unit II	Classes and Objects	11
Inheritance: Simple, Multilevel, Interfaces, Abstract classes and methods, Implementation of Polymorphism ,Method Overloading, Method Overriding, Nested and Inner classes. Modifiers and Access Control ,Packages- Packages Concept, Creating user defined packages, Java Built in packages, java.lang->math, java.util->Random, Date, Hashtable, Wrapper clas- ses		
Unit III	Collection	8
Collection Framework. ,Interfaces- Collection- List- Set- SortedSet- Enumeration- Iterator - ListIterator, Classes- LinkedList- ArrayList- Vector- HashSet- TreeSet- Hashtable Working with maps, Map interface, Map classes- HashMap- TreeMap		
Unit IV	File and Exception Handling	9
Exception: Exception types, Using try catch and multiple catch, Nested try, throw , throws and finally ,Creating user defined Exceptions, File Handling: Stream, ByteStream Classes, CharacterStream Classes, File IO basics, File op- erations, Creating file, Reading file(character, byte), Writing file (character, byte)		
Unit V	Applet, AWT and Swing Programming	9

Applet: Introduction, Types applet, Applet Life cycle, Creating applet, Applet tag, Applet Classes,Color- Graphics-Font , AWT: Components and container used in AWT, Layout managers, Listeners and Adapter classes, Event Delegation model Swing: Introduction to Swing Component and Container Classes	
Text Books	1.Programming with JAVA - E Balgurusamy
Reference Books	1. The Complete Reference – JAVA Herbert Schildt 2. Core java –II By Cay S. Horstmann and Gary Cornell 3. Compete Reference J2EE – Jim Keogh
Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3301

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Student should be able to understand the basics of Java, JDK, JVM, JRE and get to understand the OOPsconcepts.	2	S
CO2	Students should be able to create class, object, constructor, packages and polymorphism.	2	Emp
CO3	Students should be able to understand and implement the collection, framework, map, vector.	3	Emp
CO4	Students should be able to understand and implement exception handling and file handling.	3	Emp
CO5	Students should be able to understand Applet, AWT and Swing Programming.	2	S

CO-PO Mapping for CA 3301

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	3	2	2	2	3	2	2	2	2	2
CO 2	2	2	2	2	3	3	3	3	3	2	2	2
CO 3	3	2	2	2	2	2	3	2	2	3	2	3
CO 4	3	3	2	3	1	2	2	2	2	3	2	3
CO 5	3	3	2	3	3	2	2	2	3	3	3	3
Avg	2.6	2.4	2.2	2.4	2.2	2.2	2.6	2.2	2.4	2.6	2.2	2.6

CA 3303	Title: Digital Logic Fundamentals	L T P C 3 2 0 4
Version No.	1.0	
Course Prerequisites	Computer Fundamentals	
Objective	Understand the basic arithmetic operations are automated in computer system and use these concepts to automate more complex real life problems after studying combinational circuits	
Expected Outcome	• Students should be able to understand various Fundamental of Digital Electronics like number systems, inter conversion and binary codes etc. • Students should be able to understand the Binary arithmetic ,significance of complements of number, logic gates and NAND NOR implementation • Students should be able to understand the working of logic family and their comparison on the basis of power consumption, noise margin , fan in, fan out. • Students should be able to understand Boolean algebra Laws , solve k-Map for simplification of Boolean functions and implementation of POS and SOP simplification using logic gates. Students should be able design various combinational circuits	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Number System & Data Representation	10
Number System: Binary, octal, decimal & hexadecimal number system and their inter conversion. Binary Codes: BCD, Excess 3, parity, gray, ASCII & EBCDIC codes, their advantages and disadvantages. Data Representation: positive, negative, maximum and minimum number representation (related to 8 bit number) real number representation, underflow, overflow, range and accuracy of numbers.		
Unit II	Binary Arithmetic	10
Binary Addition, decimal subtraction using 9's and 10's compliment, binary subtraction using 1's and 2's compliment, multiplication and division logic gates: truth table, properties and symbolic Representation of not , NAND , or, nor ,NAND , ex-or, ex-nor gates. NOR- and NAND gates as a universal gates.		
Unit III	Boolean Algebra	10
Laws and identities of Boolean algebra Demorgan,s theorem. Use of Boolean algebra for simplification of logic expression. Karnaugh map for 2,3 4 variable, simplification of SOP AND POS logic expression using k-map		
Unit IV	Combinational circuits	9
Half adder, Full adder, parallel adder, half Subtractor, full Subtractor , 4-bit binary adder/subs tractor, multiplexor, DE multiplexer, decoder, encoder, parity detector.		
Unit V	Logic Family	9
Construction and working of TTL NAND and NOR gates. Construction and working of CMOS TTL NAND AND NOR GATES. Concept of tri -state logic, comparison of TTL AND CMOS LOGIC family with respect to propagation delay time, power consumption , noise immunity, noise margin , fan-in and fan-out		
Text Books	1. M.Morris Mano, "Digital Design "PHI, New Delhi.	

Reference Books	1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics". McGraw Hill. 2. S.K. Bose. "Digital Systems". New Age International.
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA 3303

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to understand various Fundamental of Digital Electronics like number systems, inter conversion and binary codes etc.	2	S
CO2	Students should be able to understand the Binary arithmetic ,significance of complements of number, logic gates and NAND NOR implementation	2	Emp
CO3	Students should be able to understand the workingof logic family and their comparison on the basis of power consumption, noise margin , fan in, fan out.	2	Emp
CO4	Students should be able to understand Boolean algebra Laws, solve k-Map for simplification of Boolean functions and implementation of POS and SOP simplification using logic gates.	2	S
CO5	Students should be able design various combinational circuits.	2	S

CO-PO Mapping for CA 3303

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	3	1	3	2	3	2	2	3	3
CO 2	3	3	3	2	1	2	1	1	3	2	1	2
CO 3	2	3	3	2	2	2	3	2	2	3	2	2
CO 4	3	2	3	1	2	2	2	2	3	3	2	1
CO 5	3	3	3	2	2	2	3	3	3	3	3	2
Avg	2.8	2.6	2.8	2.0	1.6	2.2	2.2	2.2	2.6	2.6	2.2	2.0

CA 3340	Title: Programming in Java Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	Knowledge of object-oriented paradigm in the Java programming language, .The use of Java in a variety of technologies and on different platforms.	
Expected Outcome	• Student should be able to understand the basics of Java, JDK, JVM, JRE and get to understand the OOPs concepts. • Students should be able to understand and implement the collection, framework, map, vector. • Students should be able to understand Applet, AWT and Swing Programming.	

List of Experiments

1. To demonstrate the general structure of java language with its various data types.
2. To accept 5 subject marks through command line arguments, find the average and total of the mark. Display the result in various grades as follows.
   Greater than 80 % outstanding
   60 – 80 first class
   50 – 60 second class
   40 – 50 third class
   less than 40 Fail.
3. Create one single dimensional array type of string and display the text in alphabetical order.
4. Generate a multi level inheritance program which used to demonstrate constructor overloading.
5. Generate a java program which shows the difference between static, final,, abstract access modifiers.
6. Create one object array to store minimum 50 students database.
7. Create one interface with all arithmetic operations and implement it to demonstrate Interface implementation.
8. Create one package to operate on all arithmetic operations and import those methods in normal java program.
9. To do the following operations on the given set of strings.
   a)concatenation. b) Comparison c) Character extraction. d)Length of string.
   use string buffer to generate the list of string operations.(any 7 functions)
10. Create a java program to explain multiple try and nested try block statements.
11. Create your own exception to handle the exception when the input value is more than 10.
12. Generate one single thread. a) using Thread class b) using Runnable Interface.
13. To find factorial of list of number reading input as command line argument.
14. To find prime series reading N as command line argument.
15. To sort list of elements in ascending and descending order and show the exception handling.
16. To implement constructor overloading by passing different number of parameter of different types.
17. To create student report using applet, read the input using text boxes and display the o/p using buttons.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3340

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	student should be able to write and execute basic programs of java	3	S
CO2	student should be able to write and execute program of threads	3	S
CO3	student should be able to write and execute basic program of applets	3	S

CO-PO Mapping for CA 3340

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	3	3	2	3	1	2	3	3	3	2
CO 2	2	3	2	2	2	3	2	3	3	3	3	3
CO 3	3	2	2	3	3	1	3	2	2	2	2	2
Avg	2.7	2.3	2.3	2.7	2.3	2.3	2.0	2.3	2.7	2.7	2.7	2.3

SEMESTER 4 Year -2

CA 3401	Title: Computer Networks	L T P C 3 2 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	The main objective of his course is to introduce the fundamental types of computer networks and to demonstrate the TCP/IP and OSI models and basic functions of individual layers of studied models.	
Expected Outcome	• Students should be able to understand the fundamental concepts of computer networking. To master the concepts of protocols, network interfaces • , and physical transmission media. • Students should be able to understand the terminology and concepts of the OSI reference model and the TCP/IP reference model. Study data link layer concepts, design issues, and protocols. • Students should be able to understand topological and routing strategies for an IP based networking infrastructure. • Students should be able to understand the transport layer services and protocols and gain knowledge about connection establishment and termination. • Students should be able to understand the use of cryptography and network security.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to Computer Networks	10
Introduction of Computer Network and the types, Network Components, Elements of Data communication , Services and Protocols, Network Topologies, Transmission modes, Analog and digital signals, The OSI Reference Model and TCP/IP Model and Comparison, signal transmission, Switching Techniques- Circuit, Message switching, Packet Switching, Physical Transmission Media.		
Unit II	Layered Architecture & Data Link Layer	10
Introduction to Layered Architecture and Information Flow, The OSI Reference Model and TCP/IP Model and Comparison, Data link Layer design issues, Error Detection and Error Correction Techniques, Flow Control (Sliding Window Protocol), Physical Addressing, Medium Access Techniques, Network Interfaces, ARP & RARP Protocol.		
Unit III	Network Layer & its Protocols	9
Network Layer design issues, Internetworking, IPV4 & IPV6 Protocols, Logical Addressing-IP Addressing &Subnetting, Routing and Routing Protocols (RIP, OSPF, BGP), Network Address Translation (NAT), ICMP Protocol, Tunneling.		
Unit IV	Transport Layer & its Protocols	10

Introduction to Transport Layer, Transport layer Services (Connection Oriented and Connectionless Services), Segmentation, port addressing , Error control (checksum) , Flow Control, Congestion Control Techniques, TCP and UDP Header, Three Way Handshaking Process(Connection Establishment and Termination), Quality of Services(QoS).		
Unit V	**Application Layer**	**9**
Introduction to Application Layer and its Services, Security - Cryptography Techniques (Public Key and Private Key Cryptography) , Firewall, Compression Techniques(Lossy and Lossless Compressions), Domain Name System(DNS), Internet Architecture, Telnet, HTTP, FTP, SMTP and E-mail. Wireless connectivity(cellular, IEEE 802.16 WiMax, Bluetooth, zigbee, infrared, LTE)		
Text Books	1. Computer Networks- A Top-Down approach, BehrouzForouzan, McGraw Hill. 2. Computer Networks (4th edition), Andrew Tanenbaum, Prentice Hall.	
Reference Books	1. Data Communications and Networking (4th edition), BehrouzForouzan, McGraw Hill. 2. Computer Networking- A Top-Down approach, 5th edition, Kurose and Ross, Pearson.	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA 3401

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Students should be able to understand the fundamental concepts of computer networking. To master the concepts of protocols, network interfaces, and physical transmission media.	**2**	**S**
CO2	Students should be able to understand the terminology and concepts of the OSI reference model and the TCP/IP reference model. Study data link layer concepts, design issues, and protocols.	**2**	**S**
CO3	Students should be able to understand topological and routing strategies for an IP based networking infrastructure.	**2**	**Emp**
CO4	Students should be able to understand the transport layer services and protocols and gain knowledge about connection establishment and termination.	**2**	**Emp**
CO5	Students should be able to understand the use of cryptography and network security.	**2**	**Emp**

CO-PO Mapping for CA 3401

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	3	2	3	2	2	2	3	2
CO 2	3	2	2	1	2	2	3	2	2	2	2	2
CO 3	3	2	2	2	2	2	2	2	2	3	2	2
CO 4	2	3	2	2	2	3	2	3	2	2	3	2
CO 5	3	2	2	3	2	1	2	2	2	2	2	3
Avg	2.8	2.2	2.0	2.0	2.2	2.0	2.4	2.2	2.0	2.2	2.4	2.2

CA 3402	Title: Computer Organization	L T P C 3 2 0 4
Version No.	**1.0**	
Course Prerequisites	Nil	
Objective	To understand aspects of computer architecture and program performance, To provide essential understanding of different subsystems of modern computer system and design aspects these subsystems, To understand the stages in instruction life cycle	
Expected Outcome	• Student should be able to understand about the fundamental organization of a computer system • Student should be able to understand about addressing modes, instruction formats and program control statements • Student should be able to understand about the architecture and functionality of central processing unit. • Student should be able to understand about the Exemplify in a better way the Input- Output organization • The student should able to understand the basics of Input Output Organization	
Unit No.	**Unit Title**	**No. of Hrs (Per Unit)**
Unit I	**Computer Fundamentals & Data Representation**	**8**
Functional units of digital systems & their interconnections, Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro operation, Arithmetic Logic Shift Unit, Booth Multiplication Algorithm, IEEE standard for Floating point numbers.		
Unit II	**Control Design**	**7**
Instruction types, formats, Instruction cycles & sub cycles, Fundamental Concepts (Register Transfers, performing of arithmetic or logical operations, fetching a word from memory, Storing a word in memory Hardwired Control, Micro programmed control		
Unit III	**Processor Design & Pipelining**	**7**
Processor Organization: General register organization, Stack organization, Addressing mode, Data transfer & Manipulations, Pipelining-Introduction, linear pipe-line processor		
Unit IV	**Input-Output Organization**	**7**
Peripheral devices, Input-Output Interface, I/O ports, Modes Of Transfer, Types of interrupts & exceptions, Priority Interrupt, DMA, Input-Output Processor (IOP)		
Unit V	**Memory Organization**	**7**
Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory		
Text Books	1. HAMACHER, "Computer Organization", McGraw Hill Education. 2. John P Hayes, "Computer Architecture and Organization", McGrawHill Education.	

Reference Books	1. William Stallings, "Computer Organization and Architecture: Designingfor Performance", Library of Congress Cataloging-in-Publication. 2. David A Patterson and John L Hennessy,"ComputerOrganizationand Design: The Hardware/Software Interface", ARMEdition.
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA 3402

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Student should be able to understand about the fundamental organization of a computer system	2	S
CO2	Student should be able to understand about Processor Organization Aspects	2	S
CO3	Student should be able to understand about the Instruction flow and functionality of central processing unit.	2	S
CO4	Student should be able to understand about t Input- Output organization	2	S
CO5	The student should able to understand the memory organization components	2	S

CO-PO Mapping for CA 3402

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3
CO 5	2	2	2	3	3	2	1	2	3	3	2	2
Avg	2.8	2.0	2.4	2.2	2.0	2.4	2.0	2.4	2.6	2.8	2.2	2.4

CA 3405	Title: C# .Net	L T P C 3 1 0 4
Version No.	**1.0**	
Course Prerequisites	CA 3101	
Objective	With the help of this course students will able to design websites, and understands the working process of social networking sites.	
Expected Outcome	• Students should be able to understand the compilation process of. net framework and web prog introduction. • Students should be able to understand the Fundamentals of C# Language. • Students should be able to understand all the concepts of Function and arrays. • Students should be able to understand all the concepts of Graphical User Interface. • Students should able to understand database connectivity and concept of front-end and back-end.	
Unit No.	**Unit Title**	**No. of Hrs (Per Unit)**
Unit I	**Web Programming Introduction**	**7**
Compilation Process of .Net Framework, Different types of application, Web Application Introduction, the Understanding role of the web server and web browser.Object Orientation; Type Safety; Memory Management; Platform Support; C# and CLR; CLR,		
Unit II	**C# Language Fundamentals**	**7**
Java Vs C#, History and Features, C# Program, Declaring and Initializing Variables, Explicitly Typed Variable, C# Data types, Operators and Keywords, Interface, Control Flow Statements, Operator, Looping Syntax, Comments, Partial Classes and Methods		
Unit III	**Function and Arrays**	**7**
Function, Advantage of Function, Declaration of Function and Its Syntax, User-Defined Functions, Call by Value and Call by Reference, Recursion, User Input and Output in C#, Arrays, Array Declaration and Initialization, Multidimensional Arrays, Accessing Array Elements, Accessing Array using Loop, Passing Array to Function, Complete Opps		
Unit IV	**Graphical User Interface Concepts**	**8**
Window Forms, Event Handling: mouse and keyboard, Labels, Textboxes, Checkboxes, Radio Buttons, Picture Boxes, Month Calendar, Date Time Picker, Link Label, Grid View, Combo Box, Multi-threading: Thread States, Life cycle of thread, Thread Priorities, Exception Handling.		

Unit V	GUI with ADO.NET	7
Database Overview, ADO.NET Introduction, ADO.NET Data Providers, ADO.NET SQL Server, ADO.NET Connection , ADO.NET Command , ADO.NET DataReader, ADO.NET DataSet,ADO.NET DataAdapter		
Text Books	1.“Application of .Net Technology”Tata McGraw Hill Education 2. Andrew Troelsen; Pro C# And The . Net 3. 5 Platform Dreamtech Press 2. “Beginning Visual C#”, Wiley India Publication.	
Reference Books	1. Joel Murach; Murach's C# , Shroffmurachs	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA 3405

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should able to explain the web designing and life cycle concepts of ASP.Net	2	S
CO2	Students should able to implements GUI applications	3	Emp
CO3	Students should be able to implement the Master Page & Validation Controls programming with C#.	3	Emp
CO4	Students should be able to understand Multimedia and Graphics application with C#.	3	Emp
CO5	Students should be able for designing and developing database with SQL Server 2008.	2	S

CO-PO Mapping for CA 3405

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	3	3	2	2	3	3	3	3	3	3
CO 2	3	3	3	3	3	3	3	3	3	2	3	3
CO 3	3	2	2	2	3	1	2	2	2	2	3	2
CO 4	2	3	3	3	2	3	3	3	3	3	2	3
CO 5	3	3	2	3	3	2	3	2	2	3	3	2
Avg	2.6	2.8	2.6	2.8	2.6	2.2	2.8	2.6	2.6	2.6	2.8	2.6

CA 3440	Title: Computer Network Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	Lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work	
Expected Outcome	• students should be able to Understand computer network basics, IP addressing. • students should be able to Acquire knowledge of using simulators for different connections. • students should be able to learn about framing techniques.	

List of Experiments

1. Study of different – 2 Network Cables and Network Interfaces.
2. Study & Implementation of IP Addressing & Sub Netting Concept.
3. Study & Implementation of Basic Network Commands and Network Configuration Commands.
4. Installation of Network Simulator (NS2).
5. Installation of Packet Tracer Tool.
6. Configure a Network Topology with Packet Tracer Tool.
7. Simulate a small Network using Network Simulator (NS2) Tool.
8. Write a program to simulate Bit-Stuffing & Char-Stuffing Data Framing Techniques.
9. Study of basic network command Network configuration commands.
10. Write a program to simulate Hamming Code (7-Bit) Error Control Technique

Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA 3440

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	students should be able to Understand computer network basics, IP addressing.	2	S
CO2	students should be able to Acquire knowledge of using simulators for different connections.	2	S
CO3	students should be able to learn about framing techniques.	2	S

CO-PO Mapping for CA 3440

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	3	3	2	2	2	3	3	3	3	3
CO 2	2	3	3	3	2	3	3	3	2	1	3	1
CO 3	3	2	1	3	2	1	3	2	2	3	2	3
Avg	2.7	2.3	2.3	3.0	2.0	2.0	2.7	2.7	2.3	2.3	2.7	2.3

CA 3442	Title: C# .Net Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objective	With the help of this course students will able to design websites, and understands the working process of social networking sites.	
Expected Outcome	• Students should able to learn how to implement on console application. • Students should able to learn how to implement on window application. • Students should able to learn how to design a registration page and use of validation control.	

List of Experiments

1. WAP to design an application using Console Application.
2. WAP to design an application using Window Application.
3. WAP to design system calculator with some scientific controls.
4. WAP to Age Calculator Using DateTimePicker (Year(s)-Month(s)-Day(s)).
5. Exercises on all basic control flow construct.
6. WAP to design registration page and apply validation control on it.
7. WAP to design an application using checkbox, month calendar, and label. When checkbox is checked month calendar is open and selected date from the calendar is display on the label.
8. WAP to add and retrieve student data using connected architecture.
9. WAP to add and retrieve student data using disconnected architecture.
10. WAP to generate mark sheets of students and display using grid view controls.

Text Books	1."Application of .Net Technology" Tata McGraw Hill Education 2. Andrew Troelsen; Pro C# And The . Net 3. 5 Platform Dreamtech Press 2. "Beginning Visual C#", Wiley India Publication.
Reference Books	1. Joel Murach; Murach's C# , Shroffmurachs
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA 3442

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to Learn about Graphical User Interface concept and its different controls.	2	S
CO2	Students should be able to Understand the different Validation control and master page designing.	2	S
CO3	Students should be able to Learn the database connectivity in detail and concept of array and structure.	2	S

CO-PO Mapping for CA 3442

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	3	3	3	2	2	3	3	3	3	3
CO 2	3	3	2	3	3	2	2	2	3	2	1	3
CO 3	3	2	2	1	2	3	2	2	2	1	2	2
Avg	2.7	2.3	2.3	2.3	2.7	2.3	2.0	2.3	2.7	2.0	2.0	2.7

BCA-MAWT Specialization

CA 3406	Title: Interactive Web Application Development	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	The main objective of his course is to introduce the fundamental types of computer networks and to demonstrate the TCP/IP and OSI models and basic functions of individual layers of studied models.	
Expected Outcome	• In this course, the students will be learning about • Understand the fundamental principles of PHP and Perl, including variables, data types, control structures, and functions. • Apply PHP and Perl to create and modify web applications and scripts, including handling user input, database integration, and error handling. • Analyze the performance and security issues of PHP and Perl code and recommend improvements based on best practices. • Evaluate the suitability of PHP and Perl for specific programming tasks and compare their strengths and weaknesses. • Create complex web applications and scripts using PHP and Perl, incorporating advanced features such as object-oriented programming, regular expressions, and modules.	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	PHP Basics	9
Introduction to PHP, Setting up PHP Development Environment, PHP Code Syntax, Variables & Constants, Operators, Control Statements, Arrays, Strings, Functions		
Unit II	PHP Web	9
Get & Post, Cookies, Sessions, Sending email		
Unit III	PHP Advance Concepts	9
PHP Advanced-Object Oriented Programming, Database, Handling, Ajax programming		
Unit IV	Perl Basics	9
Introduction to Perl, Setting up Perl Development, Environment, Perl Code Syntax, Variables & Scalars, Operators, Control Statements, Arrays, Strings, Subroutines, IO		
Unit V	PERL Advance Concepts	9
Perl Advanced-Object Oriented Programming, Socket Programming, Database Access, Perl CGI Programming.		
Text Books	1. PHP and MYSQL: Create - Modify - Reuse by Timothy Boronczyk, Martin E. Psinas	

Reference Books	1. Perl Black Book by Steven Holzner 2. Learning Perl by Randal L. Schwartz
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CS3406

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	• Understanding PHP Development Environment and code syntax.	2	Emp
CO2	• Understanding different web related features.	2	Ent
CO3	• Understanding advance concept OOPS, Database Handling and Ajax programming.	2	S
CO4	• Applying Perl code including Control Statements, Arrays, Strings and I/O.	3	Emp
CO5	• Applying advance programming concepts like Socket programming and CGI	4	Emp

CO-PO Mapping for CS3406

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3
CO 5	2	2	2	3	3	2	1	2	3	3	2	2
Avg	2.8	2.0	2.4	2.2	2.0	2.4	2.0	2.4	2.6	2.8	2.2	2.4

CA 3407	Title: Android Application Development-CAP-III	L T P C 3 0 0 2
Version No.	1.0	
Course Prerequisites	Nil	
Objective	CO1: Explain Android development environment, Architecture and android components CO2: List and explain the different layouts, user interface elements CO3: Understand the android storage and data management techniques	
Expected Outcome	Students will understand the development of mobile application	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit 1	Introduction to Android and Android Studio	15
Introduction to Android Architecture: Introduction, History, Features and Android Architecture. Android Application Environment, SDK, Tools, The Android Manifest, Configuring the Emulator, Application Components, Activity, Manifest File, Programming paradigms and Application Components, Intents, Content providers, Broadcast receivers, Services.		
Unit 2	User Interface Design	15
User Interface Design: Views &View Groups, Views : Button, Text Field, AutoCompleteTextView, Radio Button, Toggle Button, Checkbox, Spinner, Image View, floating Button, ProgressBar Image switcher, Event Handling, Listeners		
Unit 3	Android Layouts and Menu Options	15
I. Layouts: Linear, Relative, Constraint Layout, List View, ArrayAdapter, Grid View, Table View, Web View, Adapters. II. Menus: Option Menu, Context Menu, Popup Menu TimePicker, DatePicker. III. Action Bars, Notifications: Status, Toasts and Dialogs, Styles and Themes, Creating Custom Widgets, Focus, Touch Mode, Screen Orientation.		
Text Books	1. Aaron M. Tenenbaum,YedidyahLangsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India.	
Reference Books	1. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India. 2. A.K. Sharma ,Data Structure Using C, Pearson Education India. 3. Rajesh K. Shukla, "Data Structure Using C and C++" Wiley Dreamtech Publication.	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA 3407

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Explain Android development environment, Architecture and android components.	2	S
CO2	List and explain the different layouts, user interface elements.	2	Emp
CO3	Understand the android storage and data management techniques.	3	Emp

CO PO mapping for **CA 3407**

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	3	3	2	2	3	1	3	2	3
CO 2	3	1	1	2	2	3	2	2	3	1	3	2
CO 3	2	3	3	1	2	2	2	2	3	2	2	2
Avg	2.3	2.3	2.0	2.0	2.3	2.3	2.0	2.3	2.3	2.0	2.3	2.3

CA 3443	Title: Interactive Web Application Development Lab	L T P C 0 0 4 2
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	Students have to implement the concepts of the courses to design a team project to demonstrate their knowledge acquired and skill developed. Each student has to complete the below listed experiments as a part of student-readiness for the project undertaken.	
Expected Outcome	• Create a well-designed and well-formed, professional Web site utilizing the mo t • Demonstrate knowledge in web technologies including HTML, XHTML, CSS authoring software, and client-side scripting • Create client-side scripts to add interactivity to Web pages	

List of Experiments

Develop a PHP web application performing Arithmetic calculations
Develop PHP web applications, manipulating user data such as user name, password, and so on
Develop a PHP web application track the user as how many times visited and last visited time
Develop a PHP web application, listing the products based on search condition using Array
Develop a PHP web application listing the products based on search condition using Ajax
Develop a Perl script to manipulating files such as creating, writing, reading and deleting
Develop a Perl script to manipulating user data such as user name, password, and so on
Develop a Perl script to exchange data / simple chat application using sockets.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course outcome for CA3443

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Create a well-designed and well-formed, professional Web site utilizing the most current standards and practices	2	Emp
CO2	Demonstrate knowledge in web technologies including HTML, XHTML, CSS, image-editing software, web authoring software, and client-side scripting	2	Emp
CO3	Create client-side scripts to add interactivity to Web pages	2	Emp

CO PO mapping for CA3443

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	3	3	2	2	3	1	3	2	3
CO 2	3	1	1	2	2	3	2	2	3	1	3	2
CO 3	2	3	3	1	2	2	2	2	3	2	2	2
Avg	2.3	2.3	2.0	2.0	2.3	2.3	2.0	2.3	2.3	2.0	2.3	2.3

CA 3444	Title: Android Application Development-CAP Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	CO1: Explain Android development environment, Architecture and android components CO2: List and explain the different layouts, user interface elements CO3: Understand the android storage and data management techniques	
Expected Outcome	• Explain Android development environment, Architecture and android comp • List and explain the different layouts, user interface elements • Understand the android storage and data management techniques	

List of Experiments

Install android studio and configure AVD, Hello World Android Application and show Hello Toast messages.

Create Android Application show Activity Life cycle methods, Create Android Application with Multiple Activities and implement intent methods

Create Android Application for user registration with nice UI

Create any Android Application with nice UI using different layouts (Linear, Relative, Constraint Layout)

Create android application with Option Menu, Context Menu, Popup Menu TimePicker, DatePicker.

Create android application with Toast messages and different Dialog boxes. Create android application with TextView, EditText, Button, ScrollView.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3444

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	Explain Android development environment, Architecture and android components.	2	S
CO2	List and explain the different layouts, user interface elements.	2	Emp
CO3	Understand the android storage and data management techniques.	3	Emp

CO PO mapping for CA 3444

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	3	3	2	2	3	1	3	2	3
CO 2	3	1	1	2	2	3	2	2	3	1	3	2
CO 3	2	3	3	1	2	2	2	2	3	2	2	2
Avg	2.3	2.3	2.0	2.0	2.3	2.3	2.0	2.3	2.3	2.0	2.3	2.3

BCA Normal

CA 3403	Title: Web Technology	L T P C 3 2 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To introduce PHP language for server side scripting, To introduce XML and processing of XML Data with Java, To introduce Server side programming with Java Servlets and JSP,To introduce Client side scripting with JavaScript and AJAX.	
Expected Outcome	• Students should be able to understand the fundamentals of PHP. • Students should be able to understand various fundamentals of XML. • Students should be able to understand and implement the concept of Servlet with JDBC concept. • Students should be able to understand various fundamentals of JSP • Students should be able to understand client side scripting concepts and its implementation.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to PHP	11
Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.		
Unit II	XML	9
XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.		
Unit III	Introduction to Servlets	10
Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.		
Unit IV	Introduction to JSP	9
The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.		
Unit V	Client side Scripting	9
Introduction to Javascript: Javascript language – declaring variables, scope of variables, functions. event handlers (onclick, onsubmit etc.), Document Object Model, Form validation. Simple AJAX application.		

Text Books	1. Web Technologies, Uttam K Roy, Oxford University Press 2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill
Reference Books	1. Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dreamtech 2. Java Server Pages —Hans Bergsten, SPD O'Reilly,
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	14-05-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome For CA 3403

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to understand the fundamentals of PHP.	2	S
CO2	Students should be able to understand various fundamentals of XML.	2	S
CO3	Students should be able to understand and implement the concept of Servlet with JDBC concept.	3	Emp
CO4	Students should be able to understand various fundamentals of JSP.	2	Emp
CO5	Students should be able to understand client side scripting concepts and its implementation.	2	Emp

CO-PO Mapping for CA 3403

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	2	3	2	2	2	3	3	2	2	2
CO 2	3	2	2	3	2	3	2	2	2	2	2	2
CO 3	2	2	2	2	3	2	3	3	3	3	3	3
CO 4	2	3	3	3	2	2	2	2	3	2	2	3
CO 5	2	2	3	2	3	1	3	3	3	3	2	3
Avg	2.2	2.2	2.4	2.6	2.4	2.0	2.4	2.6	2.8	2.4	2.2	2.6

CA 3441	Title: Web Technology Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	To provide the basics of internet and various application of internet like e-mail, FTP, Telnet, Newsgroups and video conferencing	
Expected Outcome	• students should be able to learn about web technology and gain the skills. • students should be able to gain the skills and project-based experience needed for entry into web application and development careers. • students should be able to develop a dynamic webpage.	

List of Experiments

1. Create a Web page with all type of CSS.
2. Create a Web page using HTML to embed an image map in a Web page.
3. Program using DOM & SAX parsers.
4. Creating web pages using Dream Weaver
5. Write a HTML code t o illustrate the uses of Ordered List, Unordered List, Definition List.
6. Write a XML file which will display the book information including Title of book, Author name, ISBN no., Edition, Price.
7. Write a Java Script to prompt for users name and display it on screen.
8. Design HTML form for keeping students record and validate it using Java Script.
9. Validation of user queries and responses in the Forms using Java Script or VBscript
10. Create a Homepage with frames, animation, background sound and hyperlinks
11. Develop hitometer for each client i.e. number of visitors. Visit to a site.
12. Designing simple server side program which accept some request from the client and respond

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome For CA 3441

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	students should be able to learn about web technology and gain the skills.	2	S
CO2	students should be able to gain the skills and project-based experience needed for entry into web application and development careers.	3	Emp
CO3	students should be able to develop a dynamic webpage.	3	Emp

CO-PO Mapping for CA 3441

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	1	2	1	3	3	2	2	2	1	1
CO 2	3	2	3	2	3	1	2	2	3	3	3	3
CO 3	1	3	3	3	2	3	2	3	3	3	3	3
Avg	2.3	2.3	2.3	2.3	2.0	2.3	2.3	2.3	2.7	2.7	2.3	2.3

SEMESTER 5 Year -3

CA 3501	Title: PHP and MYSQL Programming	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	By the completion of the Web Development with PHP/MySQL course you should be able to Understand the usage of PHP and MySQL in dynamic web development.	
Expected Outcome	• Students should be able to understand the concept of PHD, Decisions and Loop. • Students should be able to understand and implement the function from various perspective in PHP. • Students should be able to understand the array and its implementation in PHP. • Students should be able to understand the concept of session, cookies and HTML forms and file directories. • Students should be able to understand the database connectivity.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to PHP, Decisions and loop	7
Evaluation of PHP, Basic Syntax, Defining variable and constant, PHP Data type, Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.		
Unit II	Function	7
What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function.		
Unit III	Array	7
Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function.		
Unit IV	Session, Cookies and HTML Forms, File Directories	8
Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session, Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission, Understanding file& directory, Opening and closing, a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.		
Unit V	Database Connectivity with MySql and Exception Handling	7
Introduction to RDBMS, Connection with MySQL Database, Performing basic database operation (DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query Join (Cross joins, Inner joins, Outer Joins, Self joins.) Understanding Exception and error, Try, catch, throw. Error tracking and debugging.		

Text Books	3. "Expert PHP and MySQL" by Andrew Curioso, Ronald Bradford 4. "Web Programming with PHP and MySQL" by Max Bramer
Reference Books	1. PHP and MySQL Web Development by Luke Welling, Laura Thomson 2. The Complete Reference 1st Edition
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studies on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome For CA 3501

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	Students should be able to understand the concept of PHD, Decisions and Loop.	2	S
CO2	Students should be able to understand and implement the function from various perspectives in PHP.	2	Emp
CO3	Students should be able to understand the array and its implementation in PHP.	3	Emp
CO4	Students should be able to understand the concept of session, cookies and HTML forms and file directories.	2	S
CO5	Students should be able to understand and implement database connectivity with MySql and understand the concept ot exception handling.	3	Emp

CO-PO Mapping for CA 3501

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	1	1	3	2	3	2	2	2	3	1
CO 2	2	2	2	2	2	2	3	2	3	2	2	1
CO 3	2	1	2	3	2	2	2	3	3	3	2	3
CO 4	3	3	3	2	3	3	2	2	3	2	2	2
CO 5	3	2	3	3	2	2	2	2	3	3	2	3
Avg	2.6	2.0	2.2	2.2	2.4	2.2	2.4	2.2	2.8	2.4	2.2	2.0

EE 3503	Title: Mobile Technology	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	It covers all the topics that are necessary to learn for repairing and servicing mobile phones.	
Expected Outcome	• Students should be able to understand the fundamentals of Basic Electronics and Mobile phone. • Students should be able to understand the hardware & materials of mobile handset. • Students should be able to repair and diagnose the general problems in Mobile Phone. • Students should be able to understand the components of audio section . • Students should be able to understand software and its applications.	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Introduction to Basic Electronics and Mobile Telephony	6
Introduction to mobile phones, Generations of mobile phones, FHSS networks, Concepts of GSM , 2g , 3g , 4g LTE , WAP , GRS ,EDGE , UMTS , EVDO, Spread spectrum, CDMA, TDMA & Basic electronics components & architecture, Types of networks in cell phones, Dual Band(SIM) Handset, Tablets & Smartphone Identification of components		
Unit II	Introduction to Hardware & Materials	
Handset Specific operating systems, Handset features & applications, working principle of mobile handset & Components used in mobile handsets. Usage of Digital Millimeter, Resistors, Capacitors and coils, Diodes & Transistors, Crystal, ICs & SMD's Identification of the different parts ,Learn to understand the parts and functioning		
Unit III	Introduction to Audio Section & Video Section	6
Components of Audio Section Nomenclature of the Audio components Study of Mike & Speaker, Vibrator and ringer theory, Functioning of Key pad LEDs Working Principles of Key Pad LED,Trouble shooting of the touch screen mobiles, Handsets assembly& disassembly of cell phone.		
Unit IV	Trouble Shooting &Jumpering Techniques	8
Network problems, Power failure (dead), Mobile phone hardware troubleshooting (water damage, hanging, charging & keypad problems), Soldering & disordering &SMD rework station, Formatting / unlocking of cell phone, , Remove/replace Component & Mobile phone hardware troubleshooting (Troubleshooting through circuit diagram, transmission, transmitter filter, microphone, reception, Antenna, RF power amplifier, local oscillator, Audio IC, speaker, charger etc.)		
Unit V	Software and its applications	4
Virus Applications, Blue Tooth Operations, Breaking of Network Locks, Downloading applications and IMEI solution with software, basics of Operating Systems and Description.		
Text Books	1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”,	

	DreamTech, 3. James Dovey and Ash Furrow, "Beginning Objective C", Apress,
Reference Books	1. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development: Exploring the iOS SDK", Apress, 2013.
Mode of Evaluation	Internal and External Examinations.
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for EE 3503

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Students should be able to understand the fundamentals of Basic Electronics and Mobile phone.	2	S
CO2	Students should be able to understand the hardware & materials of mobile handset.	2	S
CO3	Students should be able to Repair and Diagnose the general problems in Mobile Phone.	3	S
CO4	Students should be able to understand trouble shooting and jumpering techniques.	3	S
CO5	To understand the software application in mobile phone.	2	S

CO-PO Mapping for EE 3503

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	3	3	2	2	1	2	2	2	2	2
CO 2	2	2	2	2	3	2	2	2	2	2	2	2
CO 3	3	3	2	3	2	3	3	2	3	2	2	3
CO 4	2	1	2	2	2	1	2	2	3	3	3	3
CO 5	3	3	3	3	2	2	3	2	3	3	3	3
Avg	2.4	2.2	2.4	2.6	2.2	2.0	2.2	2.0	2.6	2.4	2.4	2.6

CA3543	Title: MYSQL and PHP Programming Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	By the completion of the Web Development with PHP/MySQL course you should be able to Understand the usage of PHP and MySQL in dynamic web development.	
Expected Outcome	• Student should be able to understand of HTML, CSS & JavaScript. Also able to create website using HTML and CSS & JavaScript. • Students should be able to change content of web page using Ajax. • Students should be able to connect to database and insert data in database.	

List of Experiments

1. Write a program to create menu using HTML and CSS.
2. Build PHP MySQL 5 Star rating System using AJAX.
3. Write a program to sort an array of associative arrays by value of a given key in PHP.
4. Create a Sign Up form using server side form validation in PHP.
5. Exercise on to implement File System functions.
6. How create CAPTCHA in PHP contact form.
7. Write a program to upload multiple files/images in MySQL database.
8. Create CRUD Operations with MySQL in PHP.
9. Build a Login and User authentication system in PHP.
10. Write a program to manage session in PHP.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3543

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	Student should be able to understand of HTML, CSS &JavaScript. Also, able to create website using HTML and CSS & JavaScript.	2	Emp
CO2	Students should be able to change content of web page using Ajax.	3	Emp
CO3	Students should be able to connect to database and insert data in database.	3	Emp

CO-PO Mapping for CA 3543

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	3	2	2	1	2	2	2	3	3	3	3
CO 2	2	2	3	3	3	2	3	2	2	2	3	2
CO 3	3	2	3	3	2	2	2	3	2	1	2	3
Avg	2.7	2.3	2.7	2.7	2.0	2.0	2.3	2.3	2.3	2.0	2.7	2.7

EE3547	Title: Lab on Mobile Technology	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	To perform practical's &understand about basic component used in mobile technology.	
Expected Outcome	• Student should be able to identify different types of mobile cell phones & their components • Students should be able to use the correct hardware tools to repair mobile cell phones • Students should be able to use the disassembling and assembling a mobile cell phone	

List of Experiments

1. To understand the Basic circuit of Mobile phone (Transmitter, Receiver and Base band control Section)
2. To study working of SIM card in GSM handset SIM card detection.
3. To Study and observe Transmitted/Received RF signal
4. Study and observe Transmitted (I & Q) /Received (I & Q) signals constellations.
5. Identification of various electronics & electrical components
6. Fabrication of mobile phone power supply using PCB & soldering
7. Study of switch faults in User Interface Section of 4G LTE Smart PhoneTechBook
8. Study and analyze the Power Management Unit in 4G LTE Smart Phone TechBook

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3547

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Student should be able to identify different types of mobile cell phones & their components	2	Emp
CO2	Students should be able to use the correct hardware tools to repair mobile cell phones	2	S
CO3	Students should be able to use the disassembling and assembling a mobile cell phone	2	S

CO-PO Mapping for CA 3547

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	1	1	2	1	2	2	3	2	3	2	2
CO 2	3	3	3	3	2	1	3	1	3	3	2	3
CO 3	3	2	3	3	3	3	2	3	1	2	3	1
Avg	2.7	2.0	2.3	2.7	2.0	2.0	2.3	2.3	2.0	2.7	2.3	2.0

BCA-MAWT Specialization

CA3509	Title: iOS Application Development CAP-IV	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	Explain Xcode setup ios application Navigation Understand iOS App UI elements Gain knowledge on how to publish Apps to the Apple App Store	
Expected Outcome	CO1: Explain Xcode setup ios application Navigation CO2: Understand iOS App UI elements CO3: Gain knowledge on how to publish Apps to the Apple App Store	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit 1	iOS Navigation and Interface Design	11
Creating the Xcode Project- Project Settings, Creating the User Interface, Running the App in the Simulator, Adding App Behavior, Dismissing the Keyboard- App Icons and Launch Images, Views and Controllers- View Controller, Tab Bar Controller, Navigation Controller,Creating the Interface- Creating the Project, Creating the Views, Design the Contacts Screen, Add Navigation Controller for the Date Screen, Activating the Interface.		
Unit 2	Persistent Data and Tables in OS	10
Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.		
Unit 3	Maps, Location and Access to Hardware	10
Overview of Location and Mapping- Hardware and Sensors, Core Location, MapKit, Adding Location Information to the App- Finding Location, Adding a Map.Access to Hardware and Sensors in iOS - Getting Device Information, Monitoring Battery Status, Controlling the Camera, calling a Phone Number- Long Press Gesture, Adding Long Press to Enabled Text Field; Using Core Motion for Accelerometer Data.		
Unit 4	Graphs	9
App Monetization Strategies- Paid Apps, Ad Supported Apps, In-App Purchases, Understanding the Economics of App Stores, Owning Your Own Business- Create an LLC, Plan Your Business, Other Income Possibilities, Choosing a Platform, App Distribution Through the App/Play Stores- Android Play Store Distribution, iOS App Store Distribution, App Distribution for the Enterprise- Android Enterprise Distribution, iOS Enterprise Distribution		
Text Books	***1.*** Aaron M. Tenenbaum,YedidyahLangsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India.	
Reference Books	Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India. A.K. Sharma ,Data Structure Using C, Pearson Education India. Rajesh K. Shukla, "Data Structure Using C and C++" Wiley Dreamtech Publication.	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA3509

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Understand iOS App UI elements	2	Emp
CO2	Understand iOS App UI elements	2	Ent
CO3	Gain knowledge on how to publish Apps to the Apple App Store	2	S

CO-PO Mapping for CA3509

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	3	3	2	2	3	1	3	2	3
CO 2	3	1	1	2	2	3	2	2	3	1	3	2
CO 3	2	3	3	1	2	2	2	2	3	2	2	2
Avg	2.3	2.3	2.0	2.0	2.3	2.3	2.0	2.3	2.3	2.0	2.3	2.3

CA3545	Title: iOS Application Development CAP-IV Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	Explain Xcode setup ios application Navigation Understand iOS App UI elements Gain knowledge on how to publish Apps to the Apple App Store	
Expected Outcome	• CO1: Explain Xcode setup ios application Navigation • CO2: Understand iOS App UI elements • CO3: Gain knowledge on how to publish Apps to the Apple App Store	

List of Experiments

Install Xcode and Create Hello world iOS Application
Create iOS Application Dismiss the Keyboard- change App Icons and Launch Image
Create iOS Application using View Controller, Tab Bar Controller, Navigation Controller
Create iOS Application Pass the Data Between Controllers
Create iOS application to capture the user information such as name, gender, mobile number, mail id, city, state, and country with nice UI and save the data
Create iOS Application implement the map kit and display current location
Create iOS Application demonstrate how to Access the Hardware and Sensors in iOS - Getting Device Information
Create iOS application to Monitoring Battery Status Controlling the Camera

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA3545

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Explain Xcode setup ios application Navigation	2	Emp
CO2	Understand iOS App UI elements	2	Emp
CO3	Gain knowledge on how to publish Apps to the Apple App Store	2	Emp

CO-PO Mapping for CA3545

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	3	3	2	2	3	1	3	2	3
CO 2	3	1	1	2	2	3	2	2	3	1	3	2
CO 3	2	3	3	1	2	2	2	2	3	2	2	2
Avg	2.3	2.3	2.0	2.0	2.3	2.3	2.0	2.3	2.3	2.0	2.3	2.3

CA3544	Title: Advanced Python Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The learning objectives of this course are to understand why Python is a useful scripting language for developers to design and program Python applications and how they can implement lists, tuples, and dictionaries in Python programs. and also able to implement all basic functionalities of python	
Expected Outcome	• Students should be able to understand basic principles of Python programming language • Students should be able to Implement object oriented concepts • Students should be able to Implement database and GUI applications.	

1. Numpy , Pandas ,and matplotlib library basic implementation.
2. Write a NumPy program to save a given array to a text file and load it.
3. Write a NumPy program to create a 3x3x3 array filled with arbitrary values
4. Write a NumPy program to convert a given array into a list and then convert it into a list again.
5. Write a NumPy program to create a 10x10 matrix, in which the elements on the borders will be equal to 1, and inside 0.
6. Write a NumPy program to compute the x and y coordinates for points on a sine curve and plot the points using matplotlib.
7. Write a Pandas program to get the powers of an array values element-wise.
   Note: First array elements raised to powers from second array
   Sample data: {'X':[78,85,96,80,86], 'Y':[84,94,89,83,86],'Z':[86,97,96,72,83]}
   Expected Output:
   X Y Z
   0 78 84 86
   1 85 94 97
   2 96 89 96
   3 80 83 72
   4 86 86 83
8. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels. Sample Python dictionary data and list labels:
   exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'],
   'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],
   'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],
   'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']}
   labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
9. Write a Python program to draw a line with suitable label in the x axis, y axis and a title
10. Write a Python program to draw a line using given axis values taken from a text file, with suitable label in the x axis, y axis and a title.
    Test Data:
    test.txt
    1 2
    2 4
    3 1

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA 3544

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to Write, Test and Debug Python Programs	**2**	**S**
CO2	Students should be able to Implement Conditionals and Loops for Python Programs	**3**	**S**
CO3	Students should be able to Use functions and represent Compound data using Lists, Tuples and Dictionaries	**3**	**Em p**

CO-PO Mapping for CA 3544

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	2	3	3	2	2	1	3	2	3
CO 2	3	2	3	2	2	3	2	2	3	2	2	3
CO 3	2	2	2	3	3	2	3	2	2	2	3	2
Avg	2.3	2.3	2.3	2.3	2.7	2.7	2.3	2.0	2.0	2.3	2.3	2.7

Semester 6 Year 3

CA3601	Title: Intelligent Data Analytics	L T P C 4 0 0 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	Intelligent Data Analytics is the science of analyzing data to convert information into useful knowledge.This knowledge could help us to understand our world better and in many context enable us to make better decision.	
Expected Outcome	Students should be able to identify Big Data and business Implications alongwith different data categorization and Multidimensional Data Model. Students should be able to understand and analyze Data Analysis Techniqueswith Level of Measurement & Data Management and Indexing Students should be able to learn and demonstrate various Basic Statististical Analysis Techniques. Students should be able to learn and analyze Data Analysis Technique using Machine Learning. Students should be able understand reinforcement learning.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to intelligent data analytics	7
Defination of Intelligent Data Analytics,Size of Data,Growth of Data,Source of Data,Data in Data Analytics, Elements,variable and data categorization, NOIR Topology,Properties of Data, Nominal scale vs Binary Scale,OrdinalScale,Interval and Ration Scale, Multidimensional Data Model.		
Unit II	Data Defination and Analysis Techniques	7
Data Management and Indexing ,Introduction to Statistical Learning and R programming, Measure of Central Tendency ,Measures the Location of Dispersions, Practice and Analysis with R.		
Unit III	Basic Analysis Technique	7
Basic Analysis Techniques:Statistical Hypothesis Generation and Testing ,Chi-Square Test , T-Test ,Analysis of Variance,Correlation Analysis, Maximum Likelihood Test		
Unit IV	Data Analysis Technique using Machine Learning	8
Supervised Learning with Regression & classification , Support Vector Machine, Ensemble Method, Decision Tree, Random Forest , Artificial Neural Network, clustering , Associative Rule Mining , Challenge for Intelligent Data Analytics.		
Unit V	Prescriptive Analytics	7
Creating Data for analytics Through Designed Experiments , Creating data for Analytics through Active Learning and Reinforcement Learning ,Understanding Business Scenarios, scalable and parallel Computing with Hadoop and Map-Reduce.		

Text Books	1. Probability and Statistics for Engineers and Scientist(9th edition),Ronald E.Walpole, Raymond H.Myers , Sharon L.Myers. 2. Mining Massive Data Sets, A.Rajaraman, and J.Ullman , Cambridge University Press ,2012 3. Data Mining And Analysis ,Mohammed J.Zaki, Wagner Meira, Cambridge
Reference Books	1. Hadoop:The Definitive Guide(2nd edition) By Tom White ,O'Reilly , 2014 2. Biginning R:The Statistical Programming Language ,Mark Gardener, Wiley
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3601

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	Students should be able to identify Big Data and business Implications along with different data categorization and Multidimensional Data Model.	2	S
CO2	Students should be able to understand and analyze Data Analysis Techniques with Level of Measurement & Data Management and Indexing	2	S
CO3	Students should be able to learn and demonstrate various Basic Statististical Analysis Techniques.	3	S
CO4	Students should be able to learn and analyze Data Analysis Technique using Machine Learning.	3	S
CO5	In this students should be able to learn about HDFS Concepts and Interfacing with HDFS & Role ofPrescriptive Analytics	2	S

CO-PO Mapping for CA3601

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	2	2	3	2	2	3	2	2	2	2
CO 2	3	2	2	2	2	2	3	2	3	3	3	3
CO 3	2	3	3	3	2	2	3	2	2	2	3	2
CO 4	3	3	2	2	1	2	2	2	1	3	3	3
CO 5	2	3	2	2	3	2	2	2	2	2	2	2
Avg	2.4	2.6	2.2	2.2	2.2	2.0	2.4	2.2	2.0	2.4	2.6	2.4

BCA-MAWT Specialization

CA3608	Title: Application Testing	L T P C 3 0 2 4
Version No.	1.0	
Course Prerequisites	Nil	
Objective	• This course is designed to enable a clear understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry. • The course will prepare students to be leaders in software testing. Whether you are a developer or a tester, you must test software. • This course is a unique opportunity to learn strengths and weaknesses of a variety of software testing techniques	
Expected Outcome	• Students who have completed this course would have learned • Various test procesess and continuous quality improvement • Types of errors and fault models • Methods of test generation from requirements • Input space modeling using combinatorial designs • Combinatorial test generation • Test adequacy assessment using: control flow, data flow, and program mutations • The use of various test tools • Application of software testing techniques in commercial environments	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit 1	Introduction	12
Testing as an Engineering Activity, Testing as a Process, Testing axioms, Basic definitions, Software Testing Principles, The Tester's Role in a Software Development Organization, Origins of Defects, Cost of defects, Defect Classes, The Defect Repository and Test Design, Defect Examples, Developer/Tester Support of Developing a Defect Repository, Defect Prevention strategies.		
Unit 2	Test Case Design	12
Test case Design Strategies, Using Black Bod Approach to Test Case Design, Random Testing, Requirements based testing, Boundary Value Analysis, Equivalence Class Partitioning, State based testing, Cause-effect graphing, Compatibility testing, user documentation testing, Domain testing, Using White Box Approach to Test design, Test Adequacy Criteria, static testing vs. structural testing, Code functional testing, Coverage and Control Flow Graphs, Covering Code Logic – Paths – code complexity testing, Evaluating Test Adequacy Criteria.		
Unit 3	Levels of Testing	12
The need for Levers of Testing, Unit Test, Unit Test Planning, Designing the Unit Tests, The Test Harness, Running the Unit tests and Recording results, Integration tests, Designing Integration Tests, Integration Test Planning, Scenario testing, Defect bash elimination System Testing, Acceptance testing, Performance testing, Regression Testing, Internationalization testing, Ad-hoc testing, Alpha, Beta Tests, Testing OO systems, Usability and Accessibility testing, Configuration testing, Compatibility testing, Testing the documentation, Website testing		
Unit 4	Test Management	12
People and organizational issues in testing, Organization structures for testing team, Testing services, Test Planning, Test Plan Components, Test Plan Attachments, Locating Test Items, Test management, Test process, Reporting Test Results, The role of three groups in Test Planning and Policy Development, Introducing the test specialist, Skills needed by a test specialist, Building a Testing Group.		
Unit 5	Test Automation	10

Software Test Automation, skill needed for automation, scope of automation, design and architecture for automation, requirements for a test tool, challenges in automation, Test metrics and measurements, project, progress and productivity metrics.	
Text Books	1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2006. 2. Naresh Chauhan, Software Testing Principle and Practices, Oxford University Press. 3. Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.
Reference Books	1. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003. 2. Edward Kit," Software Testing in the Real World – Improving the Process", Pearson Education, 1995. 3. Boris Beizer," Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold, New York, 1990. 4. Aditya P. Mathur, "Foundations of Software Testing _ Fundamental Algorithms and Techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008. 5. The craft of software testing - Brian Marick, Pearson Education. 6. Software Testing Techniques – SPD(Oreille) .
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	09-08-2021
Date of Approval by the Academic Council on	14-11-2021

Course Outcome for CA3608

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	This course is designed to enable a clear understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry.	2	S
CO2	The course will prepare students to be leaders in software testing. Whether you are a developer or a tester, you must test software.	2	Emp
CO3	This course is a unique opportunity to learn strengths and weaknesses of a variety of software testing techniques	3	Emp

BCA-Normal

MA3603	Title: Mathematics	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To introduce the theoretical concepts of ordinary differential equations , matrixand statistics.	
Expected Outcome	To introduce the theoretical concepts of ordinary differentialequations , matrix and statistics. Students will able the understand the concepts of differentiation andintegration. Students will able the understand the concepts of correlation andregression. Students will able the understand the concepts of second orderdifferential equations with constant coefficient. Students will able the understand the concepts of time series.	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Matrix	8
Elementary Operations on matrices. Inverse of a matrix. Row rank and column rank of a matrix . Rank of matrix, Eigen values, eigenvectors of a matrix. Cayley Hamilton theorem and its application .		
Unit II	First Order Differential Equations	6
Introduction, Solution of First order differential Equations of First degree and Higher degree.		
Unit III	Second Order differential Equations withConstant Coefficient	7
Introduction, Complementary Function and Particular Integral, Solution of equations		
Unit IV	Correlation and Regression	7
Concept of correlation, positive & negative correlation, Karl Pearson's Coefficient of correlation, meaning of regression, Two regression equations, Regression coefficients and properties		
Unit V	Time series	5
Introduction to time series, Objectives of time series, Identification of trend, Components of time series, Variations in time series, Methods of Trend Analysis and Choosing appropriate forecasting model.		
Text Books	1. M.D Raisinghania, Ordinary and partial differential equations, S. Chand Publication. 2. Shanti Narayan , A Text Books of Matrices. 3.Gupta, S.C., Kapoor, V.K., "Fundamentals of Mathematical Statistics",Sultan publication.	
Reference Books	1. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, Introduction toMathematical Statistics, Pearson Education, Asia. 2.R.K.. Jain and S R K Iyengar, Advanced Engineering Mathematics,MANarosa publication	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by theAcademic	20-10-2022	

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Course Outcome for MA3603

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	To introduce the theoretical concepts of ordinary differential equations , matrix and statistics.	2	S
CO2	Students will able the understand the concepts of differentiation andintegration.	2	S
CO3	Students will able the understand the concepts of correlation andregression.	2	S
CO4	Students will able the understand the concepts of second orderdifferential equations with constant coefficient.	2	S
CO5	Students will able the understand the concepts of time series	2	S

CO-PO Mapping for MA3603

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	1	2	1	2	2	1	2	2	2	2
CO 2	3	2	2	2	2	2	3	2	3	3	3	3
CO 3	2	3	3	2	2	3	3	2	2	2	3	3
CO 4	3	3	3	2	3	2	2	2	2	3	2	3
CO 5	2	2	2	2	2	2	2	3	2	2	2	2
Avg	2.4	2.4	2.2	2.0	2.0	2.2	2.4	2.0	2.2	2.4	2.4	2.6

PROGRAM ELECTIVES

CA3503	Title:Multimedia and Animation	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	To understand the different components, different file formats and various tools of multimedia system 2. To gain knowledge in Animation and images	
Expected Outcome	After the completion of this course, the students will be able to develop applications.	
Unit No.	Unit Title	No. of hours (per Unit)
Unit I	Multimedia	8
What Is Multimedia: Interactive Multimedia – Advantages Of Interactive Multimedia – Where To Use Multimedia – Text – Graphics – Audio – Film – Video. UNDERSTANDING TEXT: Typeface or Fonts – Types of Fonts. COMPUTER GRAPHICS: 2D Computer Graphics – 3D Computer Graphics API. UNDERSTANDING SOUND: Basic Sound Concept – Audio Formats and Quality Levels – AIF Format – AU Format – EA Format – MIDI Format – Mp3 Format. UNDERSTANDING VIDEO: Digital Vs Analog Video		
Unit II	Photoshop	7
Opening and Importing Images – Resolution – Models and Colour Spaces – Layers. PAINTING PIXELS: The Painting Tools – Erasing – Fills – Type. SELECTION AND ALLIED OPERATIONS: Marquee selection and cropping – Lasso Selection – Paths – Combining and Transforming Selections.		
Unit III	Adjustments And Retouching	7
Tonal Adjustment – Colour Adjustments – Retouching By Hand. EFFECTS AND FILTERS: Blurring and Sharpening – Special Effects and Distortion – Layer Effects and Layer Styles		
Unit IV	Flash	7
Animation with Interacting – Basic Concepts – Drawing – Lines and Shapes – Strokes and Fill – Shapes and Brushes – Selection – Transformation and Reshaping – Importing Artwork and Manipulating Images. ANIMATION: Animating One Frame at a Time – Motion Tweening – Symbols and Instances – Shape Tweening – Sound		
Unit V	Actions	7
Buttons – Button action – Frame Action – Action and Movie Clip Symbols – Actions – Browsers and Networks – Beyond the Basic Actions. FLASH MX275: Interface Elements – Panels – Tools – Layer Folders – Accessibility – Video – 47 FSH (BCA) COMPUTER APPLICATIONS - 2015-2016 Components – User Interface Components – Changing the Appearance of Components.		

Text Books	1. Vishnu PriyaSingh , "A Text Book of Multimedia", 1st Ed., Computech Pub. Ltd, New Delhi 2. Nigel Chapman and Jenny Chapman, "Practical Multimedia", Wiley – Dream Tech Pvt. Ltd.
Reference Books	3. Thiagharajan and Anbumani, "Flash MX 2004", Tata McGraw Hill, New Delhi. 4. Laurie Ulrich Fuller and Robert C. Fuller, "Photoshop CS3 Bible", Willey India Pvt. Ltd.
Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA3503

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	understand the characteristics of different media; understand the representations of different multimedia data; understand different data formats .Also gain understanding about Computer Graphics.	**2**	**S**
CO2	gain understanding about photo-shop fundamentals using various tools and techniques.	**2**	**S**
CO3	use various adjustments And retouching tools and techniques to produce Special Effects such as Blurring , Sharpening , Layer Effects and Layer Styles.	**2**	**Emp**
CO4	the fundamental skills to produce basic animations and motion graphics using various tools and techniques.	**2**	**Emp**
CO5	gain understanding about Flash Software and its related components to produce advance animations and graphics.	**3**	**Emp**

CO-PO Mapping for CA3503

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	3	2	3	2	2	2	3	2
CO 2	3	2	2	1	2	2	3	2	2	2	2	2
CO 3	3	2	2	2	2	2	2	2	2	3	2	2
CO 4	2	3	2	2	2	3	2	3	2	2	3	2
CO 5	3	2	2	3	2	1	2	2	2	2	2	3
Avg	2.8	2.2	2.0	2.0	2.2	2.0	2.4	2.2	2.0	2.2	2.4	2.2

CA3504	**Title:IT Infrastructure Management**	**L T P C** **3 0 0 3**
Version No.	**1.0**	
Course Prerequisites	Nil	
Objectives	Today Networks and IT infrastructure components are the nerves, which enable the information flow both within and outside the organizations. Progressive enterprises have always faced challenges while managing and designing IT infrastructure, which will meet the business needs. Emerging technologies such as unified communications, enterprise wide networks, and next generation intelligent network	
Expected Outcome	Comprehensive, theory based understanding of the underpinning natural and physical and the engineering fundamentals applicable to the engineering discipline. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	
Unit No.	**Unit Title**	**No. of hours**
Unit I	**Introduction**	**7**
Information Technology, Computer Hardware, Computer Software, Network and Internet, Computing Resources, IT INFRASTRUCTURE- Design Issues, Requirements, IT System Management Process, Service Management Process, Information System Design, IT Infrastructure Library		
Unit II	**Service Delivery Process**	**7**
Service Delivery Process, Service Level Management, Financial Management, Service Management, Capacity Management, Availability Management		
Unit III	**Service Support Process**	**8**
Service Support Process, Configuration Management, Incident Management, Problem Management, Change Management, Release Management , STORAGE MANAGEMENT- Backup & Storage, Archive & Retrieve, Disaster Recovery, Space Management, Database & Application Protection, Bare Machine Recovery, Data Retention.		
Unit IV	**Security Management**	**7**
Security, Computer and internet Security, Physical Security, Identity Management, Access Management. Intrusion Detection, Security Information Management.		
Unit V	**IT Ethics**	**7**

Introduction to Cyber Ethics, Intellectual Property, Privacy and Law, Computer Forensics, Ethics and Internet, Cyber Crimes, EMERGING TRENDS in IT- Electronics Commerce, Electronic Data Interchange, Mobile Communication Development, Smart Card, Expert Systems.	
Text Books	1. IT Infrastructure & Its Management, Phalguni Gupta, Tata McGraw-Hill
Reference Books	1.IT Infrastructure Management ,Anita Sengar,S K Kataria and Sons
Mode of Evaluation	Internal and External Examinations
Recommendation by Boardof Studies on	08-08-2022
Date of approval by theAcademic Council	20-10-2022

Course Outcome for CA3504

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more thanOne*)
CO1	IT Infrastructure Management	2	Emp
CO2	Service Delivery Process	2	S
CO3	Service Support Process	2	S
CO4	Security Management	2	Emp
CO5	IT Ethics	2	Emp

CO-PO Mapping for CA3504

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	3	1	3	2	3	2	2	3	3
CO 2	3	3	3	2	1	2	1	1	3	2	1	2
CO 3	2	3	3	2	2	2	3	2	2	3	2	2
CO 4	3	2	3	1	2	2	2	2	3	3	2	1
CO 5	3	3	3	2	2	2	3	3	3	3	3	2
Avg	2.8	2.6	2.8	2.0	1.6	2.2	2.2	2.2	2.6	2.6	2.2	2.0

CA3507	Title: Data Compression Techniques & Algorithms	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	Gain a fundamental understanding of data compression methods for text, images, and video, and related issues in the storage, access, and use of large data sets. illustrate the concept of various algorithms for compressing text, audio, image and video information.	
Expected Outcome	• To gain a fundamental understanding of data compression methods for text,images, and video. • To understand related issues in the storage, access and use of large data sets. • To illustrate the concept of various algorithms for compressing text, audio,image and video information. • Understand the structural basis for and performance metrics for commonlyused lossy compression techniques. • Understand conceptual basis for commonly used lossy compressiontechniques.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Compression Techniques	8
Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model,		
Unit II	Compression Algorithms	6
The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.		
Unit III	Coding Algorithm	6
Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach		
Unit IV	Applications	6
File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Moveto-front coding, CALIC, JPEG-LS, Multi-resolution Approaches		
Unit V	Models	5
Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.		
Text Books	1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers 2. Elements of Data Compression,Drozdek, Cengage Learning 3. Introduction to Data Compression, Second Edition,KhalidSayood,TheMorgan aufmannSeries	
Reference Books	1. Data Compression: The Complete Reference 4th Edition byDavid Salomon,Springer 2. Text Compression1st Edition by Timothy C. Bell Prentice Hall	

Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome For CA3507

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	To gain a fundamental understanding of data compression methods for text, images, and video.	2	Emp
CO2	To understand related issues in the storage, access and use of large data sets.	2	Emp
CO3	To illustrate the concept of various algorithms for compressing text, audio, image and video.	2	S
CO4	Understand the structural basis for and performance metrics for commonly used lossy techniques.	2	Emp
CO5	Understand conceptual basis for commonly used lossy compression techniques.	1	S

CO-PO Mapping for CA3507

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	3	1	3	2	3	2	2	3	3
CO 2	3	3	3	2	1	2	1	1	3	2	1	2
CO 3	2	3	3	2	2	2	3	2	2	3	2	2
CO 4	3	2	3	1	2	2	2	2	3	3	2	1
CO 5	3	3	3	2	2	2	3	3	3	3	3	2
Avg	2.8	2.6	2.8	2.0	1.6	2.2	2.2	2.2	2.6	2.6	2.2	2.0

CA 3505	Title: Machine Learning Concepts	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To discover patterns in the user data and then make predictions based on these and intricate patterns for answering business questions and solving business problems. Machine learning helps in analysing the data as well as identifying trends.	
Expected Outcome	Students will able the understand the concepts of machine learning Students will able the understand the concepts various machine learning algorithm. Students will able the understand the concepts of Bayesian learning. Students will able the understand the concepts of instance based learning . Students will able the understand the concepts of genetic algorithm and its uses.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction of Machine Learning	8
Well defined learning problems, Designing a Learning System, Issues in Machine Learning; THE CONCEPT LEARNING TASK - General-to-specific ordering of hypotheses, Find-S, List then eliminate algorithm, Candidate elimination algorithm, Inductive bias		
Unit II	Machine Learning Algorithm	7
Decision Tree Learning - Decision tree learning algorithm-Inductive bias- Issues in Decision tree learning; Artificial Neural Networks – Perceptrons, Gradient descent and the Delta rule, Adaline, Multilayer networks, Derivation of back propagation rule Back propagation Algorithm Convergence, Generalization;		
Unit III	Evaluating Hypotheses	7
Estimating Hypotheses Accuracy, Basics of sampling Theory, Comparing Learning Algorithms; Bayesian Learning: Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayesclassifier, Bayesian belief networks, EM algorithm;		
Unit IV	Computational Learning Theory	7
Sample Complexity for Finite Hypothesis spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound Model of Learning; INSTANCE-BASED LEARNING – k-Nearest Neighbour Learning, Locally Weighted Regression, Radial basis function networks, Case-based learning		
Unit V	Genetic Algorithm	7

an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithms- General to specific beam search-Foil	
Text Books	1.Tom M. Mitchell, Machine Learning, McGraw-Hill Education (India) Private Limited 2.Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press
Reference Books	1.Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC Press 2.Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.
Mode of Evaluation	Internal and External Examination
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3505

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	about Machine Learning	2	S
CO2	Machine Learning Algorithm	3	Emp
CO3	Evaluating Hypotheses	2	Emp
CO4	Computational Learning Theory	2	Emp
CO5	Genetic Algorithm	3	Emp

CO-PO Mapping for CA3505

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	3	2	2	2	3	2	2	2	2	2
CO 2	2	2	2	2	3	3	3	3	3	2	2	2
CO 3	3	2	2	2	2	2	3	2	2	3	2	3
CO 4	3	3	2	3	1	2	2	2	2	3	2	3
CO 5	3	3	2	3	3	2	2	2	3	3	3	3
Avg	2.6	2.4	2.2	2.4	2.2	2.2	2.6	2.2	2.4	2.6	2.2	2.6

CA3506	Title: Cloud Computing Foundation	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To provide students with the fundamentals and essentials of Cloud Computing and also a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios. To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.	
Expected Outcome	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	What the cloud is and why it's a technological andbusiness game changer.	4
Cloud Computing, Cloud vs. Traditional architecture, Services models (IaaS, PaaS, SaaS), Google cloud architecture, The GCP (Google cloud platform) console, install and configure Cloud SDK, Google cloud shell, GCP APIs, Cloud shell code editor, Cloud console mobile app.		
Unit II	Use GCP to Build Your Apps	6
Computing services in the cloud, Exploring IaaS with Compute Engine, Configuring elastic apps with autoscaling, Exploring PaaS with App Engine, Event driven programs with cloud functions, Containerizing and orchestrating apps with Google Kubernetes Engine.		
Unit III	Structured and Unstructured Storage models	5
Storage options in the cloud, Structured and unstructured storage in the cloud, Unstructured storage using Cloud Storage, SQL managed services, Exploring Cloud SQL, Cloud Spanner as a managed service, NoSQL managed service options, Cloud Datastore, a NoSQL document store, Cloud Bigtable as a NoSQL		
Unit IV	Cloud APIs & Cloud Security	5
The purpose of APIs, Cloud Endpoints, Using Apigee Edge, Managed message services, Exploring Cloud SQL, Cloud Pub/Sub, Introduction to security in the cloud, The shared security model, Encryption options, Authentication and authorization with Cloud IAM, Identify Best Practices for Authorization using Cloud IAM.		
Unit V	Cloud networking, automation and management tools	6

Introduction to networking in the cloud, Defining a Virtual Private Cloud, Public and private IP address basics, Google's network architecture, Routes and firewall rules in the cloud, Multiple VPC networks, Building hybrid clouds using VPNs, interconnecting, and direct peering, Different options for load balancing, Introduction to Infrastructure as Code, Cloud Deployment Manager, Public and private IP address basics.	
Text Books	1. Marinescu D C, Cloud Computing Theory and Practice, Morgan Kaufmann.
Reference Books	1. Erl T, Mahmood Z and Martinez J W, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall. 2. Stallings W, Foundations of Modern Networking, Pearson.
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3506

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	understand the use of Cloud Computing Concepts.	2	S
CO2	solve real world application development problemsusing Google app engine, GKE.	3	Emp
CO3	understand the need of Google cloud storage options	2	Emp
CO4	understand the use of networking and management tools.	2	Emp
CO5	machine learning applications over the cloud.	2	Emp

CO-PO Mapping for CA3506

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	2	3	2	2	2	3	2	2	2	2
CO 2	2	1	2	1	3	3	2	2	2	2	2	2
CO 3	2	2	2	3	2	1	2	2	2	3	3	2
CO 4	2	3	3	2	2	2	2	3	2	2	2	2
CO 5	3	3	3	2	2	2	3	2	3	3	3	3
Avg	2.2	2.2	2.4	2.2	2.2	2	2.2	2.4	2.2	2.4	2.4	2.2

CA3508	Title: IT Application Security & Privacy	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	An introductory course about understanding Web Application Security, itsimportance and vulnerability in the industry	
Expected Outcome	• Understand modern web application development, Web Security Issues. • Be able to apply design and security principles to new problems. • Analyze and solve real world problems by exploring a web developmentframework as an implementation example. • Create dynamically generated web site complete with user accounts. • Create page level security, modular design using css and themes and datadriven content	

Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	The Owasp Project	8
Introduction to web applications security , threats and OWASP principles , introduction to secure design, typical attack models (MITM, MITB) and other attacks (DOS, ARP cache poisoning, DNS cache poisoning etc.)		
Unit II	Internet E-Mail	8
Architecture and infrastructure, functions, agents and standards , MIME and PGP , phishing, spamming and spoofing, DKIM, SPF, Introduction to email forensics		
Unit III	Browser	8
general concepts, functionalities, browsers war, browsers comparison ,configuration (cookies, contents, scripting, etc.) ,Attack to browsers and users tracking/profiling (third party cookies, supercookies, cookie theft etc.) Browser security (add-ons, same-origin policy etc.) and secure browsing		
Unit IV	Web Server	6
Introduction to a secure set-up of Apache ,Firewalling a web server		
Unit V	Privacy Preserving	6
Attacks to privacy (spyware and backdoors, browser, email etc.) ,Identity theft ,Advanced browser configuration ,Anonymity		

Text Books	1. Web Application Security, A Beginner's Guide 1st Edition, by BryanSullivan, Vincent Liu (Author) 2. The Web Application Hacker's Handbook: Finding and ExploitingSecurity Flaws, by Dafydd Stuttard, Marcus Pinto (Author)
Reference Books	1. Mastering Modern Web Penetration Testing , Prakhar Prasad (Author)
Mode of Evaluation	Internal and External Examinations
Recommended by Board Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3508

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more thanOne*)
CO1	Understand modern web application development, Web Security Issues	2	Emp
CO2	Apply design and security principles to new problems.	2	Emp
CO3	Analyze and solve real world problems by exploring a web development framework as an implementationexample	2	S
CO4	Create dynamically generated web site complete withuser accounts	2	Emp
CO5	Create page level security, modular design using cssand themes and data driven content	1	Emp

CO-PO Mapping for CA3508

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	2	2	3	3	3	2	3	2	2	2
CO 2	2	3	3	3	1	2	3	3	2	2	2	2
CO 3	3	3	3	3	2	2	3	2	3	3	1	3
CO 4	3	2	2	2	3	3	2	3	3	2	3	3
CO 5	3	3	3	3	2	2	3	2	2	3	3	3
Avg	2.6	2.6	2.6	2.6	2.2	2.4	2.8	2.4	2.6	2.4	2.2	2.6

CA3602	Title: E-Commerce	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	To develop an understanding of scope of E-Commerce. To develops an understanding of electronic market and market place. To develop an understanding of business models.	
Expected Outcome	Students would be able to analyze the concept of electronic market and market place. Students would be able to understand the business models. Students would be able to understand the business standards	
Unit No.	Unit Title	No. of hours (per Unit)
Unit 1	Overview of Electronic Commerce	7
Main Activities of E-Commerce, Broad Goals of E-Commerce, E-Commerce technical Components, Functions of E-Commerce, Prospectus of Ecommerce, Lessons from E-commerce Evolution, Scope of E-commerce.		
Unit II	E- Commerce Strategies	7
E-commerce Technical Architecture, E-commerce Essentials, Ecommerce applications, Foundation of E-commerce, Growth of E-Commerce, Advantages of E-Commerce, Disadvantages of E-commerce, progress of E-commerce in India.		
Unit III	Reference Models	7
Driving the E-commerce Revolution. E-commerce Activities, Matrix of E-commerce models, B2C, B2B, B2B Boom, E-commerce opportunity Frame work, Developing an E-commerce Strategy, International E-commerce, and International Strategy Development, Dotcom Companies.		
Unit IV	Electronic Market	7
Online Shopping, Online Purchasing, Electronic Market, Three models of Electronic Market, Markets category, International Marketing, one-to –one Marketing, Permission Marketing, pull and push technologies, B2B Hubs, B2B market places, B2B exchange.		
Unit V	Electronic Business	8
Electronic Business applications Emerging applications, Electronic Business Architecture, AMR Model for Electronic Business, Evolution of Electronic Business, Application, Dotcom companies, The Indian scenario for E-Business, electronic business implementations, B2B E-commerce, B2C E-commerce, B2B Market Place.		
Text Books	1. E-Commerce Concepts. Models, Strategies C.S.V Murthy, Himalaya Publishing House 2. The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-based	

	Business by Janice Reynolds
Reference Books	1.E-Commerce: Fundamentals and Applications by Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang
Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	08-08-2022
Date of approval by the Academic Council	20-10-2022

Course Outcome for CA3602

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	understand about Electronic Commerce	2	S
CO2	understand about Electronic Commerce strategies	2	S
CO3	understand about Reference Models	2	Emp
CO4	understand about Electronic Market	2	Emp
CO5	understand about Electronic Business	2	Emp

CO-PO Mapping for CA3602

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	1	1	2	3	2	2	2	2	2	3
CO 2	2	1	2	1	3	2	1	3	2	1	3	1
CO 3	2	2	2	2	1	3	3	2	2	2	2	2
CO 4	3	3	3	2	2	2	2	2	3	3	2	3
CO 5	3	3	3	3	3	2	3	2	3	3	2	3
Avg	2.4	2.2	2.2	1.8	2.2	2.4	2.2	2.2	2.4	2.2	2.2	2.4

CA3603	Title: Cryptography and Network Security	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To know the methods of conventional encryption .To understand the concepts of publickey encryption and number theory. To know about Techniques for ciphering.	
Expected Outcome	• Students should be able to learn about the Cryptography & Network security, along with different IT/cyber laws to combat cyber crime • Students should be able to understand and analyze how different cryptographic algorithms and hashing techniques secure data and ensure CIA triad of network security • Students should be able to understand about various forms of malicious virus threats over internet. • Students should be able to learn about firewalls and other intrusion detection techniques. • Students should be able to learn about techniques of web secuirty.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Overview	8
Information Security, Security Objectives, OSI Security Architecture, Introduction to Cryptography: Symmetric and Asymmetric Cryptography, Steganography, Symmetric Encryption Model, Introduction to Group, Conventional Encryption Techniques: Substitution ciphers and Transposition ciphers. Stream Ciphers and Block Ciphers, Prime and Relative Prime Numbers.		
Unit II	Block Ciphers & Public Key Cryptography	7
Product Ciphers, Modern Block Ciphers - Components, Shannon's theory of Confusion and Diffusion, Fiestal Structure, Data Encryption Standard (DES): Working, Round Functions and Key Generation, Key distribution, Principles of public key crypto systems: Private key and Public key, RSA algorithm, Key Management, Diffie-Hellman Key Exchange Algorithm.		
Unit III	Hash Functions and Digital Signatures	7
Message Authentication and Hash Function: Authentication Requirements, Authentication Functions, Message Authentication Code (MAC), Message Digest Code (MDC), Hash Functions, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA). Digital Signatures: Digital Signature Standards (DSS).		

Unit IV	Network & System Security	7
Key Exchange, Key Distribution, Authentication Applications: Kerberos Operation, Kerberos Servers, X.509 Certificates, Electronic Mail Security- Pretty Good \Privacy (PGP), S/MIME, TCP/IP, HTTP. System Security: Intruders – Intrusion Detection System (IDS), Viruses and Related Threats, Firewall – Types of Firewall.		
Unit V	**IP & Web Security**	**7**
IP Security: Architecture, Authentication header, Encapsulating security payloads (ESP), Key Management – Internet Key Exchange. Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET).		
Text Books	1. William Stallings, "Cryptography And Network Security – Principles and Practices", Pearson Education 2. Behrouz A. Ferouzan, "Cryptography and Network Security", Tata McGraw-Hill,	
Reference Books	1. Bruce Schneier, "Applied Cryptography", John Wiley & Sons, New York	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA3603

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to learn about the Cryptography & Network security, along with different IT/cyber laws to combat cyber crime	2	Em p
CO2	Students should be able to understand and analyze how different cryptographic algorithms and hashing techniques secure data and ensure CIA triad of network security	2	Em p
CO3	Students should be able to understand about various forms of malicious virus threats over internet.	2	S
CO4	Students should be able to learn about firewalls and other intrusion detection techniques.	2	Em p
CO5	Students should be able to learn about Basics, settingof VPN configuration and concepts of exchanging keys, modifying security policy.	2	Em p

CO-PO Mapping for CA3603

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	2	2	2	2	2	1	2	3	3	3	2
CO 2	3	3	3	2	3	2	2	3	1	2	2	2
CO 3	2	2	2	3	2	3	3	1	2	3	3	2
CO 4	2	3	2	2	2	3	3	2	2	1	2	3
CO 5	3	2	2	3	2	2	3	3	3	2	3	2
Avg	2.4	2.4	2.2	2.4	2.2	2.4	2.4	2.2	2.2	2.2	2.6	2.2

CA3606	Title: Digital Image Processing & Analysis	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	None	
Objective	To study the image fundamentals and mathematical transforms necessary for image processing. To study the image enhancement techniques. To study imagerestoration procedures. To study the image compression procedures.	
Expected Outcome	• Review the fundamental concepts of a digital image processing system. • Analyze images in the frequency domain using various transforms. • Evaluate the techniques for image enhancement and image restoration. • Categorize various compression techniques. CO5: Interpret Imagecompression standards. • Interpret image segmentation and representation techniques.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction and Fundamentals	8
Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.Image Enhancement in Spatial Domain: Introduction; Basic Gray Level Functions – Piecewise- Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.		
Unit II	Image Enhancement in Frequency Domain	7
Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters –Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian High pass Filters; Homomorphic Filtering.Image Restoration: A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Red		
Unit III	Color Image Processing	7
Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation. Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components.		
Unit IV	Registration & Segmentation	7
Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following.		
Unit V	Feature Extraction	7
Representation, Topological Attributes, Geometric Attributes, Description: Boundary-based Description, Region-based Description, Relationship. Object Recognition: Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching		
Text Books	1. Rafael C. Gonzalvez and Richard E. Woods, Digital Image Processing 2nd Edition,.; PHI.	

	2. B. Chanda, D.D. Majumder, "Digital Image Processing & Analysis", PHI
Reference Books	1. R.J. Schalkoff; Digital Image Processing and Computer Vision, John Wiley and Sons, NY 2. A.K. Jain; Fundamentals of Digital Image Processing, Prentice Hall, Upper Saddle River, NJ.
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3606

Unit-wise Course Outcome	**Descriptions**	**BL Level**	**Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)**
CO1	Students would be able to develop Mathematical background required for Machine learning architecture algorithmic/ Programming based on real life application using text and speech	2	Emp
CO2	Students would be able to develop the syntax and architecture of word and sentence architecture with its basiccopra of Natural Language	2	Emp..
CO3	Students would be able to develop model and parsing the textfor language modeling and limitations of these models also explored	2	S
CO4	Students would be able to apply applications of advanced NLP with Deep learning and machine learning frameworkare developed.	2	Ent
CO5	Students would be able to Find out the future direction and limitation of AI	1	S

CO-PO Mapping for CA3606

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	2	3	1	2	2	3	2	3	2
CO 2	3	2	3	2	1	3	2	3	2	3	2	2
CO 3	2	2	3	3	2	2	2	2	2	2	2	2
CO 4	2	3	2	2	3	3	2	3	3	2	3	2
CO 5	2	2	1	3	2	2	2	2	2	3	2	3
Avg	2.2	2.4	2.2	2.4	2.2	2.2	2	2.4	2.4	2.4	2.4	2.2

CA 3604	Title: Introduction to Cyber Laws & Crime	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To recognize the developing trends in Cyber law and the legislation impacting cyberspace in the current situation. To generate better awareness to battle the latest kinds of cybercrimes impacting all investors in the digital and mobile network. To recognize the areas for stakeholders of digital and mobile network where Cyber law needs to be further evolved.	
Expected Outcome	Make Learner Conversant With the Social and Intellectual, Property Issues Emerging From 'Cyberspace. Explore the Legal And Policy Developments In Various Countries To Regulate Cyberspace. Make Study On Various Case Studies On Real Time Crimes.	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to Computersecurity	8
Definition, Threats to security, Government requirements,Need of cyber Law, Information Protection and Access Controls,Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, Cyber Jurisprudence at International and Indian Level.		
Unit II	Cyber Law	7
International Perspectives UN & International Telecommunication Union (ITU) Initiatives Council of Europe - Budapest Convention on Cybercrime, Asia- Pacific Economic Cooperation (APEC) , Organization for Economic Co-operation and Development (OECD) , World Bank,Commonwealth of Nations.		
Unit III	Cyber Crime	7
Internet, Hacking, Cracking, Viruses, Virus Attacks, Pornography, Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, and Cyber Security		
Unit IV	Investigating Cybercrime	7
Investigating Cybercrime: Digital Evidence and Computer Forensics,Interception, Search and Seizure, and Surveillance Information Warfare, Cyber terrorism, and Hacktivism,Terrorism, Radicalization, and The War of Ideas, Trade Secret Theft and Economic Espionage, National Security		
Unit V	Organizational and Human Security	7
Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.		

Text Books	1. Debby Russell and Sr. G.T Gangemi, "Computer SecurityBasicsn (Paperback)", 2nd Edition, O' Reilly Media. 2. Thomas R. Peltier, "Information Security policies and procedures:A Practitioner's Reference", 2nd Edition PrenticeHall.
Reference Books	1. Kenneth J. Knapp, "Cyber Security and Global InformationAssurance: Threat Analysis and Response Solutions", IGI Global. 2. Jonathan Rosenoer, "Cyber law: the Law of theInternet", Springerverlag.
Mode of Evaluation	Internal and External Examination
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3604

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use , for more than One*)
CO1	understand about Computer security	2	S
CO2	understand about Cyber Law	2	Emp
CO3	understand about Cyber Crime	2	Emp
CO4	understand about Investigating Cybercrime	2	Emp
CO5	understand about Organizational and Human Security	2	S

CO-PO Mapping for CA3604

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	2	2	3	3	1	3	3	2
CO 2	1	2	3	2	3	2	2	1	3	2	2	2
CO 3	2	2	2	3	2	3	3	3	2	1	3	2
CO 4	2	3	2	2	2	3	2	3	3	3	3	3
CO 5	3	2	3	3	2	2	2	2	3	2	2	2
Avg	2.2	2.2	2.4	2.4	2.2	2.4	2.4	2.4	2.4	2.2	2.6	2.2

CA3605	Title: Introduction to Mobile Application Development.	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	To understand the basic principles of Mobile application development. To develop mobile applications.	
Expected Outcome	Students should be able to understand about to mobile application principles.. Students should be able to understand concepts of mobile programming language and practices. – Students should be able to understand about to recognize the areas for stakeholders of digital and mobile network. – Students should be able to understand concepts of mobile app testing environment. Students should be able to understand concepts of mobile services.	

Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Mobile Application Principles	8
Mobile Application Development Paradigm - What is an application? Mobile Application - Programming rules and Challenges - Mobile Programming Tools - Mobile Application Evolution - Thin Client - Fat Client - Future of Mobile App Development - Mobile Client Server App Architecture - Introduction to Client-Server Architecture - Distributed Client-Server Architecture - Role of Client-Server - Adaptation Techniques - Extended Client-Server Architecture - Mobile Data		
Unit II	Mobile Programming Language And Practices	7
Mobile App Programming in Java - Introduction to Java - Java Compiler - Java Interpreter - Advantages of Java - Disadvantages of Java - Programming Methodology - Mobile App Programming in C++ - Introduction to C++ - Symbian C++ - Microsoft embedded VC++ - Mobile Programming best practices - User Analysis - Organizational Analysis.		
Unit III	Mobile Platform and Mobile Services	7
Mobile Applications: What is Web App? - Context of Mobile Applications - Pros and Cons of Mobile Web App Evolution of Mobile Services - Types of Mobile Services - Personal Services – CommModuley Services - Introduction to Consumer Services - Various Consumer Services , Overview and Features of Mobile Services.		
Unit IV	Interlocution to Android Mobile Application	7
Introduction to Android- Android- Background & Architecture, Setting up development environment- configuring Android Studio, Dalvik Virtual Machine & .apk file,Emulator-Android Virtual Device- Launching emulator, Editing emulator settings, Emulator shortcuts, Logcat usage, Application Fundamentals:Basic Building blocks - Activities,Services,Broadcast Receivers & Content providers		
Unit V	Developing Android Application	7
Application Structure- AndroidManifest.xml, uses-permission & uses-sdk, Resources & R.java, Layouts & Drawable ResourcesActivities and Activity lifecycleFirst sample Application, UI Components -, Form widget, Text Fields, Layouts, Time and Date, Images and media, AlertDialogs & Toast, Conceps of Intents- Explicit		

Intents,Implicit intents, Android Menus- Option menu, Context menuSub menu, menu from xml, menu via code	
Text Books	1. Jeff McWherter, Scott Gowell , "Professional Mobile Application Development".
Reference Books	1. Reza, Mobile Computing Principles: "Designing and Developing Mobile Applications". 2. Murphy Mark, L. "The Busy Coder's Guide to Advanced Android Development"
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3605

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Students should be able to learn how to design and develop mobile apps for iphone, ipad and ipod as well as mobile devices types.	2	S
CO2	Students should be able to learn about basic knowledge of mobile application development in C# language and modern mobile operating systems	2	Emp
CO3	Students should be able to understand about data transmission standards	2	Emp
CO4	Students should be able to learn about systems for mobile application distribution	2	Emp
CO5	Students should be able to learn about mobile application development	3	Emp

CO-PO Mapping for CA3605

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	3	3	2	3	2	3	2	3	2	2	3
CO 2	3	3	3	3	2	3	2	2	2	3	2	1
CO 3	3	3	2	3	2	2	3	3	3	3	2	2
CO 4	2	2	3	2	2	3	3	2	3	2	3	2
CO 5	3	2	3	3	1	1	3	2	3	3	2	3
Avg	2.8	2.6	2.8	2.6	2	2.2	2.8	2.2	2.8	2.6	2.2	2.2

CA3607	Title: Introduction to Computer Vision	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	None	
Objective	To introduce students the fundamentals of image formation; To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition; To develop an appreciation for various issues in the design of computer vision and object recognition systems; and To provide the student with programming experience from implementing computer vision and object recognition applications.	
Expected Outcome	• identify basic concepts, terminology, theories, models and methods in the field of computer vision, • describe known principles of human visual system, • describe basic methods of computer vision related to multi-scalerepresentation, edge detection and detection of other primitives, stereo, motion and object recognition, • suggest a design of a computer vision system for a specific problem	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Image Formation Models	8
Monocular imaging system, Orthographic& Perspective Projection, Camera model and Camera calibration, Binocular imaging systems		
Unit II	Image Processing and Feature Extraction	7
:Image representations (continuous and discrete), Edge detection		
Unit III	Motion Estimation	7
Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion		
Unit IV	Shape Representation and Segmentation	7
Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multiresolution analysis		
Unit V	Object recognition	7
Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal Component analysis, Shape priors for recognition		
Text Books	1. Ballard D., Brown C., Computer Vision, Prentice Hall	
Reference Books	1.Sonka M., Hlavac V., Boyle R., Image Processing Analysis and Machine Design. PWS Publishers	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board ofStudied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA3607

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/Entrepreneurship (Ent)/ None(*Use , for more than One*)
CO1	To introduce students the fundamentals of image formation; To introduce students the major ideas, methods,	2	Emp
CO2	To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition;	2	Emp
CO3	To develop an appreciation for various issues in the design of computer vision and object recognition systems;	2	Emp
CO4	To provide the student with programming experience from implementing computer vision and object recognition applications.	2	Emp
CO5	The Students should be able to build image processing applications	2	Emp

CO-PO Mapping for CA3607

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	1	2	3	3	3	2	2	2	2	2
CO 2	2	3	2	3	2	2	2	2	2	2	2	2
CO 3	3	2	1	2	3	2	1	2	2	2	2	2
CO 4	3	3	3	2	1	2	2	2	2	2	2	2
CO 5	2	3	3	2	2	3	2	3	3	3	3	3
Avg	2.6	2.6	2	2.2	2.2	2.4	2.0	2.2	2.2	2.2	2.2	2.2

Program Electives – BCA MAWT (Specialization)

CA3510	Title: Cross Platform Application Development	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	• Gain knowledge on Native, Mobile web and Hybrid Apps • Gain knowledge on HTML5, CSS3 • Gain knowledge on AngularJS • Gain knowledge on Phonegap • Gain knowledge on ionic.	
Expected Outcome	• Develop Mobile web applications • Develop SPA mobile web applications using AngularJS • Develop Hybrid Apps using Phonegap • Develop nice UI Hybrid App suing ionic	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to Cross platform applications	6
Introduction to Mobile Apps, Types of Mobile Apps, Native Apps, Mobile Web Apps, Hybrid Apps, Architecture of all kinds of Apps, Introduction to cross platform, benefits of cross platforms, technology used in cross platforms.		
Unit II	Cross Platform Technologies	6
HTML5, New Features in HTML5, HTML5 forms, CSS3, New Rules in CSS3, Introduction to JS, JS expressions, JS control statements, JS factions, JS Objects, JS form validations.		
Unit III	AngularJS	6
Introduction to AngularJS, Features of AngularJS, Setting up AngularJS, AngularJS MVC, directives, scope, view, controllers, services.		
Unit IV	Phonegap	6
Introduction to Phonegap, Setting up Phonegap, UI with Phonegap, Phone Gap Events, PhoneGap APIs - Accelerometer, Camera, File, Geolocation, Media, Notification, Storage		
Unit V	Ionic	6
Ionic Overview, Ionic benefits, Setting up Ionic, Ionic CSS, Ionic JS, Ionic native API-Camera, Media, Geolocation		
Text Books	1. PhoneGap and AngularJS for Cross-platform Development by Eugene Liang Yuxian 2. PhoneGap Essentials: Building Cross-Platform Mobile Apps by John M. Wargo	
Reference Books	1. Learning Ionic by ArvindRavulavaru 2. YonathanAkliluRedda, "Cross Platform Mobile Applications Development", June 2012 3. HTML5 Covers CSS3, Javascript, XML, XHTML, AJAX, PHP &Jquery, BlackBook, Kogent Learning Solutions Inc, DreamTech Press, 2001. 4. Rodrigo Branas, "AngularJS Essentials, Design and Construct Reusable, Maintainable and Modular web applications with AngularJS"	
Mode of	Internal and External Examinations	

Evaluation	
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3510

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/Entrepreneurship (Ent)/ None(*Use , for more than One*)
CO1	To introduce students the fundamentals of image formation; To introduce students the major ideas, methods,	2	Emp
CO2	To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition;	2	Emp
CO3	To develop an appreciation for various issues in the design of computer vision and object recognition systems;	2	Emp
CO4	To provide the student with programming experience from implementing computer vision and object recognition applications.	2	Emp
CO5	The Students should be able to build image processing applications	2	Emp

CO-PO Mapping for CA3510

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	1	2	3	3	3	2	2	2	2	2
CO 2	2	3	2	3	2	2	2	2	2	2	2	2
CO 3	3	2	1	2	3	2	1	2	2	2	2	2
CO 4	3	3	3	2	1	2	2	2	2	2	2	2
CO 5	2	3	3	2	2	3	2	3	3	3	3	3
Avg	2.6	2.6	2	2.2	2.2	2.4	2.0	2.2	2.2	2.2	2.2	2.2

CA3511	Title: JavaScript Frameworks	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	• Develop familiarity with the JavaScript language. • Learn to use best-practice idioms and patterns. • Understand concepts commonly used in dynamic language programming,such as introspection, higher-order functions, and closures. • Understand advanced language features such as prototypical inheritance. • Become adept at implementing client-side interfaces through the use ofthe DOM, jQuery and AJAX.	
Expected Outcome	After learning the course the students should be able to: • Familiar with client-side Javascript frameworks and the Angularframework. • Implement single page applications in Angular. • Use various Angular features including directives, components andservices • Implement a functional front-end web application using Angular	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Introduction to JavaScript Frameworks	6
JavaScript frameworks, Need for frameworks, Types of JavaScript Frameworks, Comparison of frameworks, Node.js, AngularJS, BackboneJS, Dojo, jQuery		
Unit II	Working with Node.js	6
Features, Why use Node.js, Setting up the environment, Node programming, REPL Terminal, Loading modules, Package manager (NPM), Callbacks, Events - loop, emitter - event binding, Timers, Listeners, Buffers, Streams, File System, Global Objects, Utility modules, Web Module, Express Framework, RESTFul API, Scaling, Packaging		
Unit III	AngularJS	6
Introduction to AngularJS, MVC, Set up the environment, Directives, Expressions, Controllers, Filters, Tables, Modules, Forms, Views, Scopes, Services, Dependency Injection, Custom Directives, Routes, Factories		
Unit IV	jQuery	6
Introduction to jQuery, Selectors, Attributes, Traversing, CSS, DOM, Events, AJAX - load, GET and POST; Effects - show, hide, slide, fade, animate; jQuery UI - Interactions, Widgets, Theming		
Unit V	Introduction to the MEAN Stack	6
MEAN stack, Features, How to setup, Server side - Node.js, Express; Database - MongoDB; Front-end – AngularJS		
Text Books	1. Full Stack JavaScript Development with Mean, by Colin J Ihrig, Adam Bretz, Shroff Publications 2. Node.js in Action, by Mike Cantelon, Marc Harter, TJ Holowaychuk, Nathan Rajlich 3. Jump Start Node.js, by Don Nguyen 4. Node.js, MongoDB, and AngularJS Web Development, by Brad Dayley 5. Professional Angularjs, by ValeriKarpov	

Reference Books	1. AngularJS: Novice to Ninja, by Sandeep Panda 2. Pro jQuery 2.0, by Adam Freeman 3. HTML 5, Javascript and Jquery 24-Hour Trainer, by Dane Cameron
Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by theAcademic Council on	20-10-2022

Course Outcome for CA 3511

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Student should be able to understand about the fundamental organization of a computer system	2	S
CO2	Student should be able to understand about Processor Organization Aspects	2	S
CO3	Student should be able to understand about the Instruction flow and functionality of central processing unit.	2	S
CO4	Student should be able to understand about t Input- Output organization	2	S
CO5	The student should able to understand the memory organization components	2	S

CO-PO Mapping for CA 3511

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3
CO 5	2	2	2	3	3	2	1	2	3	3	2	2
Avg	2.8	2.0	2.4	2.2	2.0	2.4	2.0	2.4	2.6	2.8	2.2	2.4

CA3546	Title: Cross Platform Application DevelopmentLab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• Gain knowledge on Native, Mobile web and Hybrid Apps • Gain knowledge on HTML5, CSS3 • Gain knowledge on AngularJS • Gain knowledge on Phonegap • Gain knowledge on ionic.	
Expected Outcome	• Develop Mobile web applications • Develop SPA mobile web applications using AngularJS • Develop Hybrid Apps using Phonegap • Develop nice UI Hybrid App suing ionic	

List of Experiments

1. Design web site with following pages using HMTL5, which adopts to all screens
    1. Home page
    2. Login page
    3. Sign-up page
2. Develop dynamic web application for Product management using Javascript
3. Develop SPA web application for the lab exercise 1 using AngularJS
4. Develop Contact App with following using AngularJS
    1. Add Contact
    2. Delete Contact
    3. Edit Contact
5. Develop AngularJS App for capturing location with image and store locally in the phone using PhoneGap
6. Develop AngularJS App for moving object(ball) using Accelerometer and PhoneGap
7. Develop Ionic App for Playing Audio and Video based on file type(Music Player)
8. Develop Ionic App for displaying current location using Geolocation based on user movement

Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Councilon	20-10-2022

Course Outcome for CA 3546

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to Write, Test and Debug Python Programs	2	S
CO2	Students should be able to Implement Conditionals and Loops for Python Programs	3	S
CO3	Students should be able to Use functions and represent Compound data using Lists, Tuples and Dictionaries	3	Emp

CO-PO Mapping for CA 3546

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	2	3	3	2	2	1	3	2	3
CO 2	3	2	3	2	2	3	2	2	3	2	2	3
CO 3	2	2	2	3	3	2	3	2	2	2	3	2
Avg	2.3	2.3	2.3	2.3	2.7	2.7	2.3	2.0	2.0	2.3	2.3	2.7

CA3547	Title: JavaScript Frameworks Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• Develop familiarity with the JavaScript language. • Learn to use best-practice idioms and patterns. • Understand concepts commonly used in dynamic language programming, such as introspection, higher-order functions, and closures. • Understand advanced language features such as prototypicalinheritance. • Become adept at implementing client-side interfaces through the use of the DOM, jQuery and AJAX.	
Expected Outcome	After learning the course the students should be able to: • Familiar with client-side Javascript frameworks and the Angularframework. • Implement single page applications in Angular. • Use various Angular features including directives, components andservices • Implement a functional front-end web application using Angular	

List of Experiments

1. Design login page and validate fields using jQuery
2. Design simple calculator page and perform arithmetic operations using events
3. Design a web page to load multiplication of a number using ajax calls(use any server side script)
4. Design registration page and load data to the server using ajax calls
5. Design a web page to display product information using ajax calls
6. Develop a simple mobile web pages like home, login and contact us using jQuery navigation
7. Display product details using jQuery list view
8. Develop SPA for home, login and contact us using AngularJS
9. Develop AngularJS application to display product details using ajax calls
10. Develop AngularJS application to manipulate products details such as adding product, deleting product and listing products using modules and services

Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA 3547

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use , for more than One*)
CO1	Students should be able to Write, Test and Debug Python Programs	2	S
CO2	Students should be able to Implement Conditionals and Loops for Python Programs	3	S
CO3	Students should be able to Use functions and represent Compound data using Lists, Tuples and Dictionaries	3	Emp

CO-PO Mapping for CA 3547

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	2	3	3	2	2	1	3	2	3
CO 2	3	2	3	2	2	3	2	2	3	2	2	3
CO 3	2	2	2	3	3	2	3	2	2	2	3	2
Avg	2.3	2.3	2.3	2.3	2.7	2.7	2.3	2.0	2.0	2.3	2.3	2.7

CA3609	Title: Web3.0	L 3	T 0	P 0	C 3
Version No.	1.0				
Course Prerequisites	Nil				
Objective	• Understanding the concepts and principles of Web 3.0 and its potentialimpact on the internet and society. • Learning about the different decentralized technologies that are enablingWeb 3.0, such as blockchain, smart contracts, and decentralized storage. • Developing skills in using Web 3.0 tools and frameworks, such as Ethereum,IPFS, and Web3.js. • Exploring real-world Web 3.0 applications and use cases in different industries, including decentralized finance, social media, gaming, and more. • Analyzing the challenges and opportunities presented by Web 3.0, includingregulatory, legal, ethical, and social considerations.				
Expected Outcome	• Developing a solid understanding of the key concepts and principles of Web3.0. • Gaining practical experience with Web 3.0 tools and frameworks, and theability to create decentralized applications. • Analyzing and evaluating Web 3.0 applications and use cases in variousindustries. • Understanding the challenges and opportunities presented by Web 3.0 andtheir potential impact on society and the economy. • Identifying potential investment and entrepreneurship opportunities in theWeb 3.0 ecosystem. • Staying up-to-date with the latest trends and emerging technologies in theWeb 3.0 field.				
Unit No.	Unit Title	No. of Hrs (Per Unit)			
Unit I	Introduction to Web 3.0 and Decentralized Technologies	6			
• Definition of Web 3.0 • Key characteristics of Web 3.0 • Evolution of Web 3.0 from Web 1.0 and Web 2.0 • Blockchain technology • Smart contracts • Decentralized storage • Decentralized identity • Decentralized finance (DeFi) • Decentralized autonomous organizations (DAOs)					
Unit II	Web 3.0 Applications	6			
• Decentralized social media • Decentralized marketplaces • Decentralized governance • Decentralized gaming • Decentralized content creation and distribution					
Unit III	Tools and Frameworks	6			

• Ethereum and Solidity • IPFS and Filecoin • Web3.js • The Graph • Truffle and Remix		
Unit IV	**Web 3.0 Challenges and Opportunities**	**6**
• Scalability and interoperability • User adoption and education • Regulatory and legal considerations • Ethical and social implications • Investment and entrepreneurship opportunities		
Unit V	**Future of Web 3.0**	**6**
• Emerging trends and technologies • Potential impact on society and the economy • Opportunities for innovation and disruption		
Text Books	1. "Web3.js: Ethereum blockchain programming with JavaScript" by GregSidelnikov - 2. "Decentralized Applications: Harnessing Bitcoin's Blockchain Technology" by Siraj Raval. 3. "The Business Blockchain: Promise, Practice, and Application of theNext Internet Technology" by William Mougayar .	
Reference Books	1. "Cryptoassets: The Innovative Investor's Guide to Bitcoin and Beyond"by Chris Burniske and Jack Tatar . 2. "Mastering Blockchain: Distributed ledger technology, decentralization,and smart contracts explained" by Imran Bashir	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by theAcademic Council on	20-10-2022	

Course Outcome for CA 3609

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Student should be able to understand about the fundamental organization of a computer system	**2**	**S**
CO2	Student should be able to understand about Processor Organization Aspects	**2**	**S**
CO3	Student should be able to understand about the Instruction flow and functionality of central processing unit.	**2**	**S**
CO4	Student should be able to understand about t Input- Output organization	**2**	**S**
CO5	The student should able to understand the memory organization components	**2**	**S**

CO-PO Mapping for CA 3609

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3
CO 5	2	2	2	3	3	2	1	2	3	3	2	2
Avg	2.8	2.0	2.4	2.2	2.0	2.4	2.0	2.4	2.6	2.8	2.2	2.4

CA3610	Title: Advanced Android Application Development	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	Nil	
Objective	• Gain knowledge on Native API and Location API • Gain knowledge on Services, Notifications and Receivers • Gain knowledge on IPC and Sockets • Gain knowledge on Graphics • Gain knowledge on third party API integration.	
Expected Outcome	At the end of the course, students will be able to: • Use camera and location api to build Android Apps • Understand services and receivers to build Android Service Apps • Implement threads and graphics to build Game kind of Android Apps • Integrate third party api to build rich Android Apps	
Unit No.	Unit Title	No. of Hrs (Per Unit)
Unit I	Native and Location API	6
Camera, Permissions, Sensors, Bluetooth, WiFi, SMS, Telephony, GPS, Location Manager, Google Maps.		
Unit II	Services and Networks	6
Services, Broadcast Receiver, Alarm Services, Notifications, Notification manager, AIDL, Handler and Messenger, IPC, Sockets		
Unit III	Threads and Graphics	6
Process, Threads, Thread Life Cycle, Task, Asynchronous Task, Graphics Introduction, Canvas/Drawing into a view, Surface View/Surface Holder, Animation, Frame Animations		
Unit IV	Mobile Web, Integrating Facebook and Twitter	6
Web Applications, Json, Parsing Json, Web View, Viewport, Web Services, Consuming Web services, Develop clients for web services, Integrating Facebook, Integrating Twitter		
Unit V	Universal App and Material Design	6
Introduction to Universal Applications, Fragments, Designing App for Different Devices, Introduction to Material Design, Material Themes, Lists, Cards, Maintaining Compatibility.		
Text Books	1. Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012 2. Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012 3. Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013	
Reference Books	1. Beginning Android 4, by Grant Allen, Apress, 2011 2. Beginning Tablet Programming, by Robbie Matthews, Apress, 2011.	
Mode of Evaluation	Internal and External Examinations	
Recommended by Board of Studied on	08-08-2022	
Date of Approval by the Academic Council on	20-10-2022	

Course Outcome for CA3610

Unit-wise CourseOutcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Use camera and location api to build Android Apps	1	Emp
CO2	Understand services and receivers to build Android Service Apps	2	Emp
CO3	Implement threads and graphics to build Game kind of Android Apps	5	Emp
CO4	Implement third party api to build rich Android Apps	5	Emp
CO5	Use camera and location api to build Android Apps	1	Emp

CO-PO Mapping for CA 3610

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	3	2	2	2	1	2	1	2	3	3	2	3
CO 2	3	2	2	1	2	2	3	3	2	3	2	2
CO 3	3	2	3	3	2	3	2	3	2	2	3	2
CO 4	3	2	3	2	2	3	3	2	3	3	2	3
CO 5	2	2	2	3	3	2	1	2	3	3	2	2
Avg	2.8	2.0	2.4	2.2	2.0	2.4	2.0	2.4	2.6	2.8	2.2	2.4

CA3642	Title: Web 3.0 Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• Understanding the concepts and principles of Web 3.0 and its potentialimpact on the internet and society. • Learning about the different decentralized technologies that are enablingWeb 3.0, such as blockchain, smart contracts, and decentralized storage. • Developing skills in using Web 3.0 tools and frameworks, such asEthereum, IPFS, and Web3.js. • Exploring real-world Web 3.0 applications and use cases in different industries, including decentralized finance, social media, gaming, andmore. • Analyzing the challenges and opportunities presented by Web 3.0,including regulatory, legal, ethical, and social considerations.	
Expected Outcome	• Developing a solid understanding of the key concepts and principles ofWeb 3.0. • Gaining practical experience with Web 3.0 tools and frameworks, and theability to create decentralized applications. • Analyzing and evaluating Web 3.0 applications and use cases in variousindustries. • Understanding the challenges and opportunities presented by Web 3.0 andtheir potential impact on society and the economy. • Identifying potential investment and entrepreneurship opportunities in theWeb 3.0 ecosystem. • Staying up-to-date with the latest trends and emerging technologies in theWeb 3.0 field.	

List of Experiments

1. Setting up an Ethereum development environment using Truffle and Ganache.
2. Creating a simple decentralized application (DApp) using Solidity and Web3.js.
3. Building a decentralized finance (DeFi) application, such as a decentralized exchange (DEX) or lending platform, using smart contracts.
4. Developing a decentralized identity (DID) system using blockchain technology.
5. Implementing a decentralized storage system using IPFS.
6. Building a decentralized social media platform using blockchain technology and smart contracts.
7. Developing a decentralized gaming application using blockchain technology and non-fungible tokens (NFTs).
8. Integrating decentralized authentication and authorization using a decentralized identity (DID) system.
9. Testing and debugging smart contracts using the Remix IDE and Ganache.
10. Deploying a decentralized application to a test network, such as Rinkeby or Kovan

Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by theAcademic Council on	20-10-2022

Course Outcome for CA3642

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Developing a solid understanding of the key concepts and principles of Web 3.0.	2	Emp
CO2	Gaining practical experience with Web 3.0 tools and frameworks, and the ability to create decentralized applications.	2	Emp
CO3	Analyzing and evaluating Web 3.0 applications and use cases in various industries.	2	Emp

CO-PO Mapping for CA 3642

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	2	3	3	2	2	1	3	2	3
CO 2	3	2	3	2	2	3	2	2	3	2	2	3
CO 3	2	2	2	3	3	2	3	2	2	2	3	2
Avg	2.3	2.3	2.3	2.3	2.7	2.7	2.3	2.0	2.0	2.3	2.3	2.7

CA3643	Title: Advanced Android Application Development Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	Nil	
Objectives	• Gain knowledge on Native API and Location API • Gain knowledge on Services, Notifications and Receivers • Gain knowledge on IPC and Sockets • Gain knowledge on Graphics • Gain knowledge on third party API integration.	
Expected Outcome	At the end of the course, students will be able to: • Use camera and location api to build Android Apps • Understand services and receivers to build Android Service Apps • Implement threads and graphics to build Game kind of Android Apps • Integrate third party api to build rich Android Apps	

List of Experiments

1. Write a Program to Start a service
2. Write a Program to Stop a service
3. Demonstrate startService(), stopService() and onBindService()
4. Manipulate notifications
5. Android socket programming
6. Create web services
7. Working with processes and threads
   a. Create a thread which performs a single task
   b. Perform multithreading
8. Graphics apps in android
   a. Create an application where different shapes of different colors are displayed.
   b. Create an application where
   c. Create an application to show a cyclist moving from one direction to another
9. Animation apps like
   a. Bouncing ball
   b. Moving arrow, etc
10. Game creation in android like
    a. Shooting bubbles
    b. Shooting arrows
    c. Simple snake game, etc.

Mode of Evaluation	Internal and External Examinations
Recommended by Board of Studied on	08-08-2022
Date of Approval by the Academic Council on	20-10-2022

Course Outcome for CA3643

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use , for more than One*)
CO1	Developing a solid understanding of the key concepts and principles of Web 3.0.	2	Emp
CO2	Gaining practical experience with Web 3.0 tools and frameworks, and the ability to create decentralized applications.	2	Emp
CO3	Analyzing and evaluating Web 3.0 applications and use cases in various industries.	2	Emp

CO-PO Mapping for CA 3643

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)									Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO 1	2	3	2	2	3	3	2	2	1	3	2	3
CO 2	3	2	3	2	2	3	2	2	3	2	2	3
CO 3	2	2	2	3	3	2	3	2	2	2	3	2
Avg	2.3	2.3	2.3	2.3	2.7	2.7	2.3	2.0	2.0	2.3	2.3	2.7