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**PERIYAR
MANIAMMAI**
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
Established Under Sec. 3 of UGC Act, 1956 • NAAC Accredited
think • innovate • transform

FACULTY OF COMPUTING SCIENCES AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

Bachelor of Computer Applications (B.C.A)

**BCA CURRICULUM AND SYLLABUS
(SEMESTER: I, II, III, IV, V and VI)**

REGULATIONS 2021

REVISION 2

(Applicable to the students admitted from the academic year 2023-2024 onwards)

TABLE OF CONTENTS

S.No	Contents
1.	Institute Vision and Mission
2.	Department Vision and Mission
3.	Members of Board of studies
4.	Department Vision and Mission Definition Process
5.	Programme Educational Objectives (PEO)
6.	PEO Process Establishment
7.	Mapping of Institute Mission to PEO
8.	Mapping of Department Mission to PEO
9.	Programme Outcome (PO)
10.	PO Process Establishment
11	Correlation between the POs and the PEOs
12	Curriculum development process
13.	Faculty allotted for course development
14	Pre-requisite Course Chart
15	BCA – Curriculum
16	BCA– Syllabus
17	Overall course mapping with POS
18.	Annexure – I Department Advisory Committee - Members Approval Department Advisory Committee - Agenda & Minutes Department Advisory Committee - Members Feedback
19.	Annexure – II Board of Studies Meeting - Members Approval Board of Studies Meeting - Agenda & Minutes Board of Studies Meeting - Feedback from Stake holders

University Vision and Mission

Vision

To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society.

Mission

UM1: Offering well balanced programmes with scholarly faculty and state-of-art facilities to impart high level of knowledge.

UM2: Providing student - centered education and foster their growth in critical thinking, creativity, entrepreneurship, problem solving and collaborative work.

UM3: Involving progressive and meaningful research with concern for sustainable development.

UM4: Enabling the students to acquire the skills for global competencies.

UM5: Inculcating Universal values, Self respect, Gender equality, Dignity and Ethics.

Vision and Mission

Vision

To be a leading, contemporary, innovative Computer Science and Applications department in inculcating professional competencies in the field of Computing and related interdisciplinary technologies to achieve academic excellence and to facilitate research activities as a timely response to dynamic needs and challenges of industry and society.

Mission

DM1: Imparting quality education in the field of Computing Sciences and Applications and generate successful computing professional

DM2: Encouraging students to collaborative with industry environment and analyze the real world problems culminating in efficient solutions.

DM3: Transforming students into computing professionals and entrepreneurs by imparting quality training and hands on experience with latest tools and technologies.

DM4: Promoting activities in creating applications in emerging areas of computing technologies and applications in order to serve the needs of research, industry, society and scientific community.

DM5: Inculcating value based and ethical commitment for bringing out successful professionals.

MEMBERS OF THE BOARD OF STUDIES

S.No	Name of the Member	Designation and Address
1.	Dr.J.Jeyachidra	Professor and Dean FCSE, Faculty of Computing Sciences and Engineering, Periyar Maniammai Institute of Science & Technology, Vallam.
2.	Dr.D.Ruby BoS Chairman	Associate Professor and Head, Department of Computer Science and Applications, Periyar Maniammai Institute of Science & Technology, Vallam.
3.	Dr.S.Nickolas (Academic Expert)	Professor, Department of Computer Applications, NIT, Tiruchirappalli.
4.	Mr.J.Sengathir (Industry Expert)	Manager,Enterprise Resource Planning,BHEL Trichy – 620 014
5.	Dr.V.Adithya Pothan Raj (Industry Expert) Online Mode	Associate Operations Manager ,CTS, Chennai. apr1991@rediffmail.com
6.	Dr.A.Muthamizh Selvan BoS Member Internal	Asso.Prof./CSA, Periyar Maniammai Institute of Science & Technology, Vallam.
7.	Dr.S.Arumugam BoS Member Internal	Asso.Prof./CSA, Periyar Maniammai Institute of Science & Technology, Vallam.
8.	Dr.V.Srithar BoS Member Internal	Asst.Prof./CSA,Periyar Maniammai Institute of Science & Technology, Vallam.
9.	Dr.S.Bhuvanewari BoS Member Internal	Asso.Prof./ Head ,Department of Mathematics Periyar Maniammai Institute of Science & Technology, Vallam.
10.	Dr. D. Thayalnayaki BoS Member Internal	Asso.Prof./ Head, Department of Civil Engineering Periyar Maniammai Institute of Science & Technology, Vallam.
11.	Dr. V. Saranya BoS Member Internal	Asst.Prof./ Head, Department of Languages, Periyar Maniammai Institute of Science & Technology, Vallam.
12.	Ms. K. Biruntha	II MCA, Periyar Maniammai Institute of Science & Technology, Vallam.
13.	Mr. R. Muruganandham	Alumni, MCA ,Batch: 2019-2021, Machine learning engineer, Changepond Technologies, Sipcot IT park, Siruseri, Chennai-103

The current BCA Curriculum is undergone in Department Advisory Committee Meeting on **21.05.2023** and **Board of studies Meeting on 15.06.2023** to tune the syllabus towards Outcome based Education and meet the UGC requirements and in turn the suggestions provided will be implemented in Regulations 2021, Rev.2.

It is thoroughly felt there is a need to change the present curriculum in order to graduate the students who possess skills that are employable. Hence, appropriate modification in the existing curriculum will augment the manpower and skill requirement of our country. The quality of an educational system can be judged from at least three perspectives: the inputs to the system, what

happens within the system and the outputs from the system. In order to refine the input to the system, BoS members redefined the curriculum with the focus towards outcome based education. In this connection, it is felt to frame the department vision and attain the vision through a well-structured mission framed in consultation with the faculty members and other administrators of Periyar Maniammai Institute of Science and Technology.

Department Vision and Mission Definition Process

The development of vision and mission of the department is carried out as per the following steps.

- Step: I Brainstorming/Feedback carried out at different levels
 First level - Department faculty by the HOD
 Second level – Current students by the faculty
 Third level - Employers, alumni and academia and industry experts
- Step: II Benchmarking with other Universities: Understanding the Vision and Mission
- Step: III Validation by the Board of studies and then Academic Council
- Step: IV Wide publicity in the department and institution

The University Vision is split up into small elements and verifies its compliance with Department Vision

To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society

To be a leading, contemporary, innovative Computer Science and Applications department in inculcating professional competencies in the field of Computing and related interdisciplinary technologies to achieve academic excellence and to facilitate research activities as a timely response to dynamic needs and challenges of industry and society.

UNIVERSITY VISION	DEPARTMENT VISION
To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society	To be a leading, contemporary, innovative Computer Science and Applications department in inculcating professional competencies in the field of Computing and related interdisciplinary technologies to achieve academic excellence and to facilitate research activities as a timely response to dynamic needs and challenges of industry and society.
Global Dynamism Excellence in Knowledge Social Responsibility	Placement (Global Level) Teaching Learning (New Technologies) Contribution(Needs and challenges of Industry and Society)

To accomplish the vision stated, well-structured mission is established with consultation with administrators, faculty members and other officials.

UNIVERSITY MISSION	DEPARTEMENT MISSION
Offering well balanced programmes with scholarly faculty and state-of-art facilities to impart high level of knowledge.	Imparting quality education in the field of Computing Sciences and Applications and generate successful computing professional
Providing student - centered education and foster their growth in critical thinking, creativity, entrepreneurship, problem solving and collaborative work.	Encouraging students to collaborate with industry environment and analyze the real world problems culminating in efficient solutions.
Involving progressive and meaningful research with concern for sustainable development.	Transforming students into computing professionals and entrepreneurs by imparting quality training and hands on experience with latest tools and technologies.
Enabling the students to acquire the skills for global competencies.	Promoting activities in creating applications in emerging areas of computing technologies and applications in order to serve the needs of research, industry, society and scientific community.
Inculcating Universal values, Self respect, Gender equality, Dignity and Ethics.	Inculcating value based and ethical commitment for bringing out successful professionals.

Mapping of University Vision and Department Mission

	DM1	DM2	DM3	DM4	DM5	Total
UM1	3	1	1	1	1	7
UM2	1	2	3	2	0	8
UM3	0	1	2	3	2	8
UM4	1	1	3	3	0	8
UM5	1	1	0	1	3	6

0-No

relation 3- High relation 2- Medium relation 1- Low relation

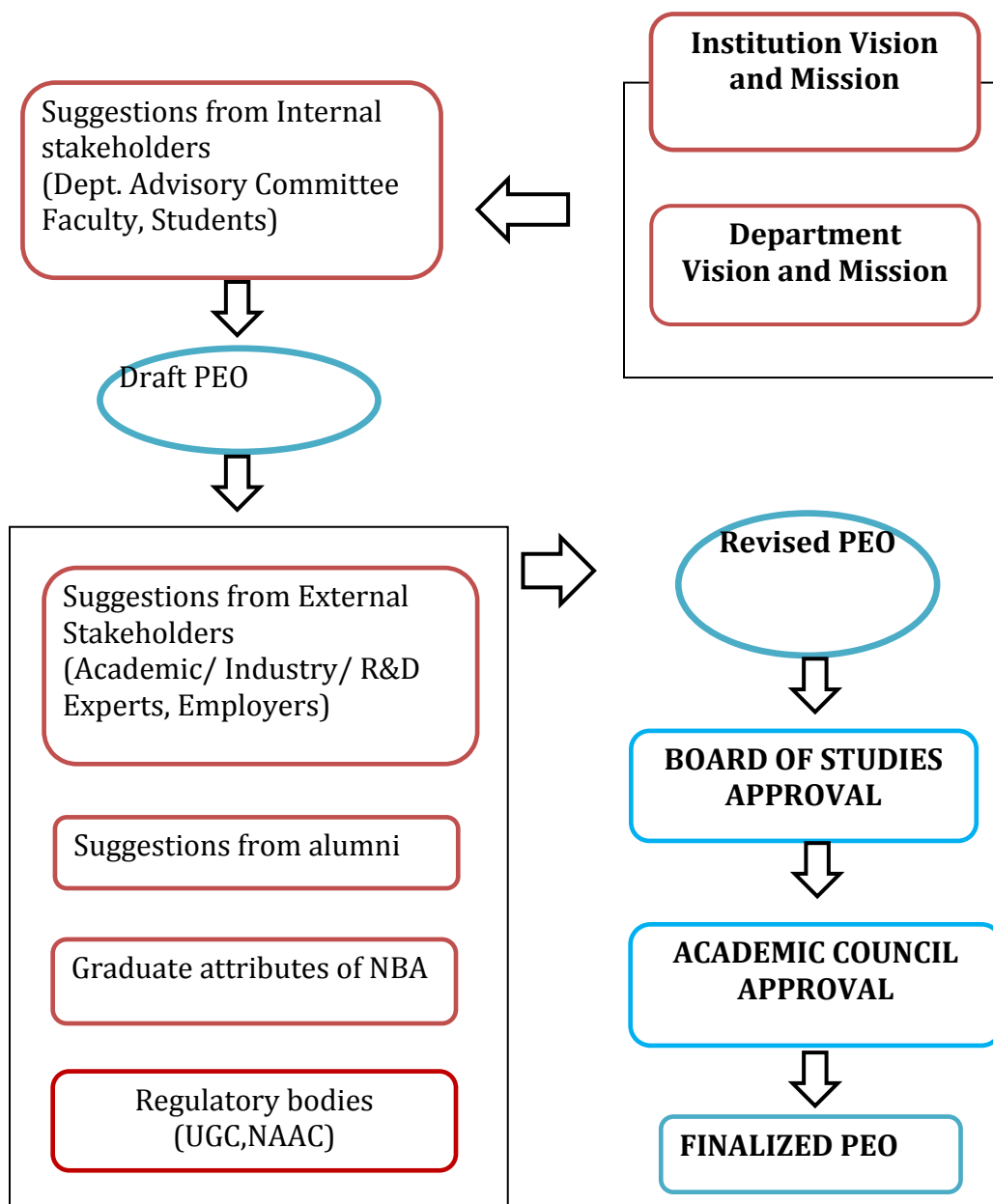
PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Based on the mission of the department, the programme educational objectives is formulated as

PEO1	The graduate will apply fundamental concepts of mathematics and computing technologies in the emerging application areas.
PEO2	The graduate will be able to understand the requirement of computing problem and implement an effective solution.
PEO3	The graduate will be able to practice professional ethics, management and team communication in the industrial and societal environment.
PEO4	The graduate will equip themselves to pursue higher studies, entrepreneurship, and apply new ideas and technologies in the evolving field.

PEO PROCESS ESTABLISHMENT

The faculty of the CSA department at our institution met on different occasions for discussion and a final work session to complete the steps of the process in order to draft the set of PEOs for CSA Department to assess the graduates few years after graduation.



The framework for the review and revision of the PEOs at the departmental level involving all the faculty members comprised the following broad stages.

1. Using the key words and phrases extracted from the Mission Statement of the institution and department to identify attributes to gauge graduates.

2. Capturing the distinction between the educational objective and the student outcomes.
3. Formulating each objective to be measurable.

The program educational objectives for the BCA program describe accomplishments that graduates are expected to attain within three years after graduation. Graduates will have applied their expertise to contemporary problem solving, be engaged professionally, and have continued to learn and adapt, and have contributed to their organizations through leadership and teamwork.

Mapping of Program Educational Objectives (PEOs) with Department Mission (DM)

	DM1	DM2	DM3	DM4	DM5
PEO1	3	2	2	1	0
PEO2	2	3	2	2	1
PEO3	2	2	3	1	3
PEO4	2	1	3	2	1
Total	9	8	10	6	5

1- Low *2 – Medium* *3-High*

The development of vision, mission and programme educational objectives is tuned in line with the global and national standards and it is assured that the department vision and mission will facilitate in meeting the vision and mission of the University.

The Program Educational Objectives shall cover both technical and professional aspects of the expected achieve-Achievement in terms of technical skills required in the profession for which the program prepares students

- Achievements in terms of professional, ethical, and Communicational aspects required by the profession for which the program prepares students (team work, ethical behavior, effective communication, etc.)
- Achievements in terms of management and leadership skills (project managers, directors, CTOs, CEOs, etc.)
- Achievements in terms of life-long learning and continuous education (certifications, conferences and workshops attendance, etc.)
- Achievements in terms of advanced and graduate studies pursuing (graduate studies, research careers, etc.)
- Other aspects could be considered when defining educational objectives such as the ability to engage in entrepreneurship activities

SUMMARY OF THE FEED BACK OBTAINED

Total number of feedbacks collected: 40

In that the following important observations were made,

1. DevOps- Implemented as Value Added Course
2. AWS - Implemented as Value Added Course
3. Google Cloud- Implemented as Value Added Course
4. Go Programming- Implemented as Value Added Course
5. Data Visualization- Implemented as Value Added Course

Based on the stakeholders' input and the attainment results from stakeholder survey, PEO statements and targets were revised.

PROGRAMME OUTCOME (PO)

At the time of graduation, competency of the student is measured through the attainment of programme outcomes. The quantification of programme outcomes attainment is measured through the assessment of established course outcomes for each course.

PROGRAM OUTCOMES	
PO 1	To apply fundamental knowledge of mathematics and Principles of Computing techniques to solve the problems in computer science and application areas.
PO 2	To analyze a computing requirement and apply programming principles for providing effective solutions.
PO 3	To design an innovative interface method to bring the complete requirement and visualize the result for decision making.
PO 4	To investigate and apply modern tools and technologies in the construction of software system.
PO 5	To practice team communication, effective management and Interpersonal skill for the successful computing professional and entrepreneur.
PO 6	To apply contextual knowledge of professional, ethical, legal, and security to assess societal, health, legal and cultural issues.
PO 7	To extend enthusiasm for self-improvement through continuous professional development and life-long learning.

PROGRAM SPECIFIC OUTCOME	
PSO1	Maintaining the system, applications, Software and network components in a computing environment
PSO2	Developing dynamic website and web enabled applications.

GRADUATE ATTRIBUTES

Graduates Attributes (GAs) form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. The GAs are examples of the attributes expected of a graduate from an accredited programme. The computing professional Graduate Attributes are derived from NBA and National Institutes.

1. Disciplinary Knowledge: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

2. Problem Analysis: Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

3. Design /Development of Solutions: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

4. Modern Tool Usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

5. Environment and Sustainability: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

6. Ethics and Social Responsibility: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

7. Effective Communication: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions

8. Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

9. Life-long Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

Table : 3 Mapping of Program Educational Objectives (PEOs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	Total
PEO 1	3	2	1	1	0	0	1	2	2	12
PEO 2	1	2	1	1	0	0	1	2	2	10
PEO 3	0	0	0	0	1	3	1	1	2	08
PEO 4	0	0	1	1	2	0	2	2	2	10
Total	4	4	3	3	3	3	5	7	8	

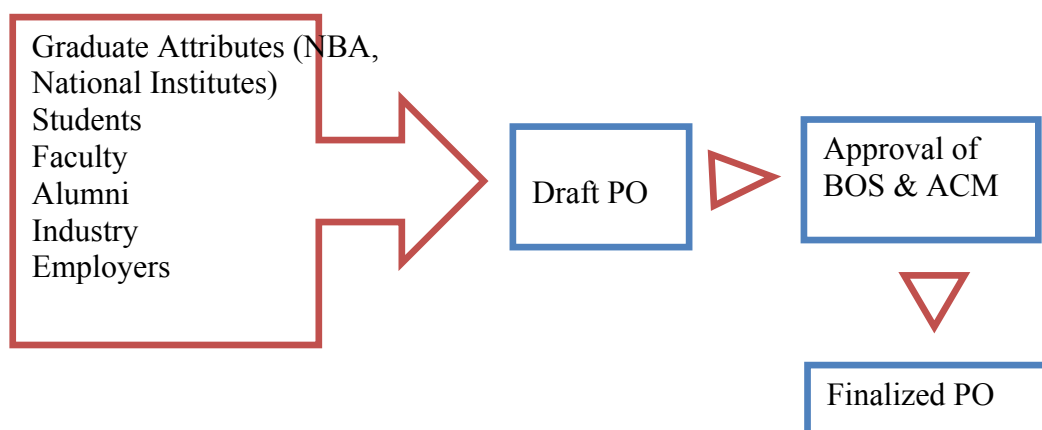
1 - Low 2 – Medium 3 – High

Table :4 Mapping of Program Outcomes (POs) with Graduate Attributes (GAs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	Total
GA1	3	1	0	0	0	0	0	2	1	7
GA2	0	3	1	0	0	0	0	3	2	9
GA3	0	0	3	0	0	0	0	2	2	7
GA4	1	1	0	3	0	0	0	2	2	9
GA5	0	0	1	0	0	0	0	1	1	3
GA6	0	2	0	0	0	2	0	0	0	4
GA7	0	1	0	0	2	0	0	2	2	7
GA8	0	1	1	0	3	0	0	2	2	9
GA9	1	0	0	1	0	0	3	2	2	9

1- Slightly 2 – Supportive 3 - Highly related

PO PROCESS ESTABLISHMENT



CURRICULUM DEVELOPMENT

The CSA curriculum is drawn to define the role of computer applications to meet the global challenges and equip them in implementing proven techniques and procedures to provide sustainable solutions for practical problems of society. In addition to their technical competencies, students must possess engagement skills, sustained learning and adapting, leadership, teamwork with good command in the communication skills.

The faculty members have been allotted for developing the courses and its outcomes as given below. They in turn conducted frequent discussions with each other and with students in drafting the course content.

The curriculum development is ensured that students receive integrated, coherent learning experiences that contribute towards their personal, academic and professional learning and development.

Courses and topics were designed and developed within a framework which comprises a specified curriculum, specified assessment arrangements, and clearly identified educational aims and learning outcomes.

Faculty Members Assigned for Course Development

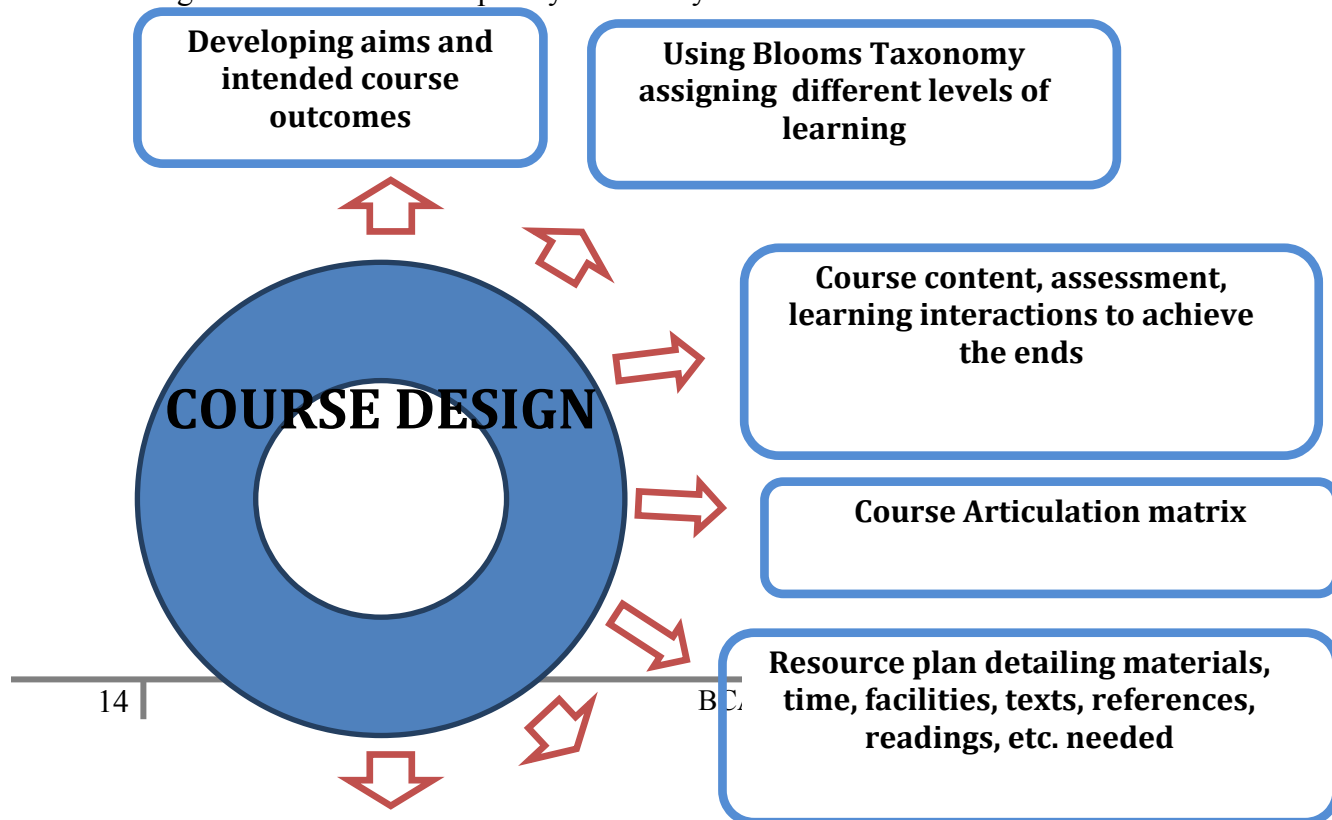
S.No	Semester	Category	Code	Subject Name	Faculty Members
1.	I	CC- 1	XCA103	C Programming	Dr.S.Arumugam
2.	I	CC- 2	XCA105	Computer Organization and Architecture	Dr.G.Preethi

	I	CC-3	XCA106	C Programming Laboratory	Dr.S.Arumugam
4.	II	CC- 4	XCA203	Object Oriented Programming with C++	Ms.P.Ranjani
5.	II	CC- 5	XCA205	Computer Networks	Dr.J.Jeyachidra
6.	II	CC- 6	XCA206	Data Structures and Algorithms	Ms.S.Manimozhi
7.	II	CC-7	XCA207	Object Oriented Programming with C++ Laboratory	Ms.P.Ranjani
8.	II	CC-8	XCA208	Data Structures and Algorithms Laboratory	Ms.S.Manimozhi
9.	III	SEC 1	XCA304	HTML and DHTML	Ms.K.Radhika
10.	III	CC- 10	XCA305	Database Management Systems	Ms.T.Logesh
11.	III	CC- 10	XCA306	Visual Programming	Dr.D.Ruby
12.	III	CC-11	XCA308	HTML and DHTML Laboratory	Ms.K.Radhika
13.	III	CC-11	XCA309	Database Management Systems Laboratory	Ms.K.Radhika
14.	III	CC-12	XCA310	Visual Programming Laboratory	Dr.D.Ruby
15.	IV	SEC 2	XCA403	Data Analytics	Ms.K.Nandhini
16.	IV	CC-13	XCA405	Java Programming	Ms.T.Logesh
17.	IV	CC-14	XCA407	Operating Systems	MS.R.Ragini
18.	IV	SEC 2- Laboratory	XCA408	Data Analytics Laboratory	Ms.K.Nandhini
19.	IV	CC-15	XCA409	Java Programming Laboratory	Ma.S.Manimozhi
20.	IV	CC-16	XCA410	Operating Systems Laboratory	Ms.K.Nandhini
21.	V	SEC-3	XCA501	XML and Web Services	Ms.G.Umamaheswari
22.	V	DSE- 1	XCA502A	Software Engineering	Ms.R.Manisha
23.			XCA502B	Internet of Things	Ms.G.Praveena
24.	V	DSE-2	XCA503A	Unix and Shell Programming	Ms.G.Umamaheswari
25.			XCA503B	Web Scripting Framework	Ms.I.Epistle
26.	V	DSE-3	XCA504A	Enterprise Resource Planning	Dr.V.Sridhar

			XCA504B	Organizational Behavior	Dr.A.Muthamizh Selvan
28.	V	SEC-3- Laboratory	XCA505	XML and Web Services Laboratory	Ms.G.Praveena
29.	V	DSE-2- Laboratory	XCA506A	Unix and Shell Programming Laboratory	Ms.G.Umamaheswari
30.			XCA506B	Web Scripting Framework Laboratory	Ms.I.Epistle
31.	VI	SEC-4	XCA601	Introduction to Python	Ms.M.Umamaheswari
32.		DSE-4	XCA602A	.Net Technologies	MS.R.Sivaranajni
33.			XCA602B	Programming with PHP and MySQL	MS.R.Sivaranajni
34.	VI	DSE-5	XCA603A	Mobile Computing	Ms.I.Epistle
35.			XCA603B	Data Science	Dr.A.Muthamizh Selvan
36.			XCA603C	Block Chain	Dr.A.Muthamizh Selvan
37.	VI	SEC-4 - Laboratory	XCA604	Introduction to Python Laboratory	Dr.G.Preethi
38.	VI	DSE -4 Laboratory	XCA605A	.Net Technologies Laboratory	MS.R.Sivaranajni
39.			XCA605B	Programming with PHP and MySQL Laboratory	MS.R.Sivaranajni

COURSE DEVELOPMENT

The following elements were developed by the faculty involved after interaction and discussions.



In aligning programme outcome and graduate attributes, course offered to the degree programme are finalized based on the standard template finalized by the university.

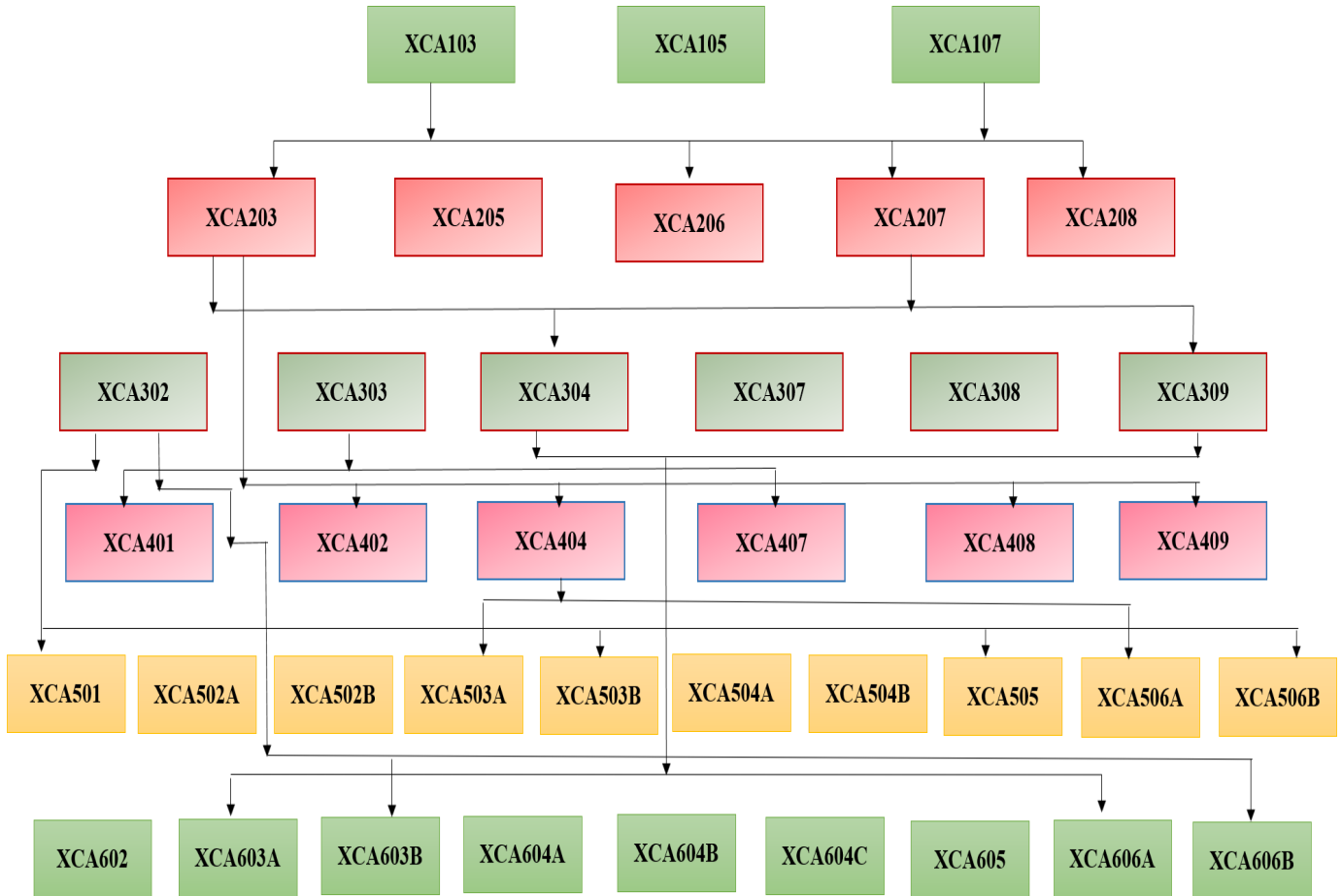
Distribution of Courses to be included as per UGC and NAAC

S.No	Category	Symbol
1.	Ability Enhancement Compulsory Course (Theory & Laboratory)	AECC
2.	Department Specific Course (Core Course) (Theory & Laboratory)	DSC(CC)
3.	Discipline Specific Elective	DSE
4.	Skill Enhancement Course	SEC
5.	Generic Elective	GE
6.	University MANDatory	UMAN
7.	In-Plant Training	IPT
8.	Extension Activities NSS, NCC, NSO, RRC and Swatch Bharath)	EA

SUMMARY OF CREDITS

S. No.	Type of Courses	Numbers	Total Credit
1	PART 1	4	12
2	PART 2	4	12
3	DSC (Theory)	4	18
4	CC	16	42
5	DSE (Theory & Laboratory)	8	33
6	SEC (Theory & Laboratory)	6	6
7	GE	3	9
8	UMAN	5	5
9	IPT	1	4
10	Field Visit	1	0
11	Extension Activities NSS, NCC, NSO, RRC and Swatch Bharath)	1	2
12	Mentor, Library, Placement Activity	1	0
	TOTAL	54	143

REQUISITE MAPPING



BACHELOR OF COMPUTER APPLICATIONS (BCA)
REGULATIONS 2021, REVISION: 2
CURRICULUM
SEMESTER – I

Category	Course Code	Course Title	Credits				Hours				
			L	T	P	Total	L	T	P	SS	Total
PART1	XGT101/ XFT101	Tamil I/Foundational Tamil I	3	0	0	3	3	0	0	0	3
PART2	XGE102	English I	3	0	0	3	3	0	0	0	3
CC- 1	XCA103	C Programming	4	0	0	4	4	0	0	0	4
DSC - 1	XCA104	Algebra, Calculus and Analytical Geometry	4	1	0	5	4	1	0	0	5
CC-2	XCA105	Computer Organization and Architecture	4	0	0	4	4	0	0	0	4
CC-3	XCA106	C Programming Laboratory	0	0	1	1	0	0	2	0	2
UMAN 1	XUM001	Human Ethics, Values, Rights and Gender Equality	1	0	0	1	1	0	0	1	2
EA		Extension Activities NSS,NCC,NSO,RRC and Swatch Bharath)									2
		Mentor, Library									2
		Field Visit	0	0	0	0	0	0	0	0	2
		Placement Activity									1
		Total	19	01	01	21	19	01	02	1	30

SEMESTER – II

Category	Course Code	Course Title	Credits				Hours				
			L	T	P	Total	L	T	P	SS	Total
PART1	XGT201/ XFT201	Tamil II/Foundational Tamil II	3	0	0	3	3	0	0	0	3
PART2	XGE202	English II	3	0	0	3	3	0	0	0	3
CC- 4	XCA203	Object Oriented Programming with C++	4	0	0	4	4	0	0	0	4
DSC - 2	XCA204	Discrete Mathematics	4	1	0	5	4	1	0	0	5
CC- 5	XCA205	Computer Networks	3	0	0	3	3	0	0	0	3
CC- 6	XCA206	Data Structures and Algorithms	4	0	0	4	4	0	0	0	4
CC-7	XCA207	Object Oriented Programming with C++ Laboratory	0	0	1	1	0	0	2	0	2
CC-8	XCA208	Data Structures and Algorithms Laboratory	0	0	1	1	0	0	2	0	2
UMAN2	XUM002	Environmental Studies	1	0	0	1	1	0	0	1	2
		Mentor , Library									2
		Total	22	01	02	25	22	01	04	1	30

SEMESTER – III

Category	Course Code	Course Title	Credits				Hours				
			L	T	P	Total	L	T	P	SS	Total
PART1	XGT301 / XFT301	Tamil III/Foundational Tamil III	3	0	0	3	3	0	0	0	3
PART2	XGE302	English III	3	0	0	3	3	0	0	0	3
SEC 1	XCA304	HTML and DHTML	1	0	0	1	2	0	0	0	2
CC- 9	XCA305	Database Management Systems	3	0	0	3	3	0	0	0	3
CC- 10	XCA306	Visual Programming	3	0	0	3	3	0	0	0	3
GE1		Generic Elective – 1	3	0	0	3	3	0	0	0	3
DSC - 3	XCA307	Statistical and Numerical Methods	3	1	0	4	3	1	0	0	4
SEC 1- Laboratory	XCA308	HTML and DHTML Laboratory	0	0	1	1	0	0	2	0	2
CC-11	XCA309	Database Management Systems Laboratory	0	0	1	1	0	0	2	0	2
CC-12	XCA310	Visual Programming Laboratory	0	0	1	1	0	0	2	0	2
UMAN3	XUM003	Disaster Management	1	0	0	1	1	0	0	1	2
		Mentor, Library									1
		Total	20	1	3	24	21	1	6	1	30

SEMESTER – IV

Category	Course Code	Course Title	Credits				Hours				
			L	T	P	Total	L	T	P	SS	Total
PART1	XGT401/ XFT401	Tamil IV/Foundational Tamil IV	3	0	0	3	3	0	0	0	3
PART2	XGE402	English IV	3	0	0	3	3	0	0	0	3
SEC 2	XCA403	Data Analytics	1	0	0	1	1	0	0	0	1
CC-13	XCA405	Java Programming	3	0	0	3	3	0	0	0	3
DSC - 4	XCA406	Resource Management Techniques	3	2	0	5	3	2	0	0	5
CC-14	XCA407	Operating Systems	3	0	0	3	3	3	0	0	3
GE2		Generic Elective – 2	3	0	0	3	3	0	0	0	3
SEC 2-Laboratory	XCA408	Data Analytics Laboratory	0	0	1	1	0	0	2	0	2
CC-15	XCA409	Java Programming Laboratory	0	0	1	1	0	0	2	0	2
CC-16	XCA410	Operating Systems Laboratory	0	0	1	1	0	0	2	0	2
UMAN4	XUM004	Entrepreneurship Development	1	0	0	1	1	0	0	1	2
		Mentor, Library									1
		Total	20	2	3	25	20	5	6	1	30

SEMESTER – V

Category	Course Code	Course Title	Credits				Hours				
			L	T	P	Total	L	T	P	SS	Total
SEC-2	XCA501	XML and Web Services	1	0	0	1	1	0	0	0	1
DSE- 1	XCA502A	Software Engineering	4	1	0	5	4	1	0	0	5
	XCA502B	Internet of Things	4	1	0	5	4	1	0	0	5
DSE-2	XCA503A	Unix and Shell Programming	4	1	0	5	4	1	0	0	5
	XCA503B	Web Scripting Framework	4	1	0	5	4	1	0	0	5
DSE-3	XCA504A	Enterprise Resource Planning	4	1	0	5	4	1	0	0	5
	XCA504B	Organizational Behavior	4	1	0	5	4	1	0	0	5
GE 3		Generic Elective – 3	3	0	0	3	3	0	0	0	3
SEC-2-Laboratory	XCA505	XML and Web Services Laboratory	0	0	1	1	0	0	2	0	2
DSE-2-Laboratory	XCA506A	Unix and Shell Programming Laboratory	0	0	1	1	0	0	2	0	2
	XCA506B	Web Scripting Framework Laboratory	0	0	1	1	0	0	2	0	2
	XCA507	Inplant Training	0	0	4	4	-	-	-	-	-
UMAN5	XUM005	Cyber Security	1	0	0	1	1	0	0	1	2
EA		Extension Activities (NSS,NCC,NSO,RRC and Swatch Bharath)	0	0	0	2	0	0	0	0	3
		Mentor, Library									2
Total			17	3	06	28	17	3	4	1	30

SEMESTER – VI

Category	Course Code	Course Title	Credits				Hours				
			L	T	P	Total	L	T	P	SS	Total
SEC-3	XCA601	Introduction to Python	1	0	0	1	1	0	0	0	1
DSE-4	XCA602A	.net Technologies	4	1	0	5	4	1	0	0	5
	XCA602B	Programming with PHP and MySQL	4	1	0	5	4	1	0	0	5
DSE-5	XCA603A	Mobile Computing	4	1	0	5	4	1	0	0	5
	XCA603B	Data Science	4	1	0	5	4	1	0	0	5
	XCA603C	Block Chain	4	1	0	5	4	1	0	0	5
SEC-3 Laboratory	XCA604	Introduction to Python Laboratory	0	0	1	1	0	0	2	0	2
DSE -4 Laboratory	XCA605A	.Net Technologies Laboratory	0	0	1	1	0	0	2	0	2
	XCA605B	Programming with PHP and MySQL Laboratory	0	0	1	1	0	0	2	0	2
DSE-6	XCA606	Project Work	0	0	6	6	0	0	10	0	10
EA		Extension Activities (NSS, NCC, NSO, RRC and Swatch Bharath)									3
		Mentor, Library									2
		Total	9	2	8	19	9	2	14	0	30

Total Credits: 143

NOTE :

AECC – Ability Enhancement Compulsory Course

DSE – Discipline Specific Elective

SEC – Skill Enhancement Course

CC – Core Course

DSC – Department Specific Course

GE – Generic Elective

UMAN – University MANDatory

LANG - Language

Summary

Total Number of courses proposed with the credits is given below:

S. No.	Type of Courses	Numbers	Total Credit
1	PART 1	04	12
2	PART 2	04	12
3	DSC (Theory)	04	18
4	CC	16	42
5	DSE (Theory & Laboratory)	8	33
6	SEC (Theory & Laboratory)	6	6
7	GE	3	9
8	UMAN	5	5
9	IPT	1	4
10	Field Visit	1	0
11	Extension Activities NSS, NCC, NSO, RRC and Swatch Bharath)	1	2
12	Mentor, Library, Placement Activity	1	0
	TOTAL	54	143

Total Credit	DSC (%)	CC (%)	DSE(%)	SEC(%)	Part I and Part-2 (%)	GE(%)	UMAN (%)	IPT (%)	Extension Activities (%)
143	18 12.6%	42 29.3%	33 23.1%	6 4.2%	24 16.8%	9 6.3%	5 3.5%	4 2.8%	2 1.4%

Generic Elective I :

Course Code	Course Name
XCAOE1	C and C++ Programming Language
XCAOE2	Digital Imaging and Editing Techniques

Generic Elective II :

Course Code	Course Name
XCAOE3	Business Analytics with Worksheet
XCAOE4	Animation and Imaging

Generic Elective III :

Course	Course Name
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Code	
XCAOE5	Mobile Application Development
XCAOE6	Programming in Python

Generic Elective IV :

Course Code	Course Name
XCAOE7	System and Network Administration
XCAOE8	PHP and MySQL

XCA103 C PROGRAMMING

Course Outcomes:

CO1	C	Remember	Defines the concept of C programming and its fundamental
CO2	C	Understand	Illustrate various control statements and arrays
CO3	C	Understand	Differentiate structures and unions
CO4	C	Understand	Explain the pointer concepts
CO5	C	Understand	Develop a program to create and process a file for different applications

COURSE CODE	COURSE NAME	L	T	P	C
XCA103	C PROGRAMMING	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	4	0	0	4
UNIT- I : INTRODUCTION TO C LANGUAGE					12
C Language - History of C - Features of C - Structure of a C Program –Pre-processors-# define- # include-Writing a C Program - Compiling and Linking a C Program - C compiler - syntax and semantic errors - link and run the C program - linker errors - logical and runtime errors - Constants, Variables and Data Types – storage – qualifiers - Operators and Expressions – Input/Output Operations – unformatted I/O - formatted I/O					
UNIT- II : CONTROL STATEMENTS AND ARRAYS					12
Control Statements - if statement - switch statement - Loop Control Statements - while loop - do-while statement - for loop – Un-conditional Controls - goto statement - break statement - continue Statement - Arrays – multi-dimensional arrays - Character arrays and Strings – dynamic arrays					
UNIT- III: FUNCTIONS, STRUCTURE AND UNIONS					12
Functions - User defined Functions – Call by value, Call by reference Categories of Functions – Recursion. Structures – declaration, definition- accessing the members of a structure - initializing structures - structures as function arguments - structures and arrays – Unions – dynamic memory allocation – malloc(), calloc(), realloc(), free()					
UNIT- IV: POINTERS					12
Pointers: Introduction-Understanding pointers-Accessing the address of a variable-Declaration and Initialization of pointer Variable – Accessing a variable through its pointer-Pointer Expressions – Pointers and Arrays- Pointers and Strings – Array of pointers – Pointers as Function Arguments- Functions returning pointers – Pointers to Functions – Pointers and Structures.					
UNIT- V: FILE PROCESSING					12
File Management in C – Definition of Files- Opening modes of files- Standard function: fopen(), fclose(), feof(), fseek(),fwind()-fgetc(), fputc(), fscanf()-program using files					
	LECTURE	TUTORIAL	PRACTICAL	TOTAL	
	60	0	0	60	
TEXT					
1. Programming in ANSI 8th Edition,935316513X · 9789353165130 By E Balagurusamy © 2019 Published: March 15, 2019					
REFERENCES					

1. Yashwant Kanetker, Let us C, BPB Publications.
2. R. B. Patel, Fundamental of Computers and Programming in C, Khanna Book Publishing Company PVT. LTD. Delhi, India, 1st edition, 2008, ISBN: 13: 978-81-906988-7-0.
3. Gottfried, Programming with C, Tata McGraw Hill.
4. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd Ed., PHI.

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1. NPTEL, Introduction to C Programming, Prof.SatyadevNandakumar ,IIT, Computer Science and Engineering Kanpur.
2. NPTEL, Introduction to Problem Solving & Programming, by Prof. Deepak Gupta Department of Computer Science and Engineering IIT Kanpur.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	2	2	1	1	1	1	2	1
CO 2	3	2	2	1	1	1	1	2	1
CO 3	3	2	2	1	1	1	1	1	1
CO 4	3	2	2	1	1	1	1	1	1
CO 5	2	2	2	1	1	1	1	1	1
Total	14	10	10	5	5	5	5	7	5
Course	3	2	2	1	1	1	1	2	1

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA 104 ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY

Course Outcome:

CO1	C	Remembering Understanding	<i>Explain</i> and <i>Find</i> derivative functions in differential calculus.
CO2	C	Applying	<i>Solve</i> the definite and indefinite integrals using various techniques.
CO3	C	Applying	<i>Apply</i> orthogonal transformation to determine eigen values and eigen vectors of a given matrix.
CO4	C	Applying	<i>Solve</i> problems using Binomial, exponential and logarithmic series expansions.
CO5	C	Remembering Applying	<i>Find</i> the distance between two points and <i>Explain</i> section formulae, slope form and intercept form.

COURSE CODE	COURSE NAME	L	T	P	C
XCA104	ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Mathematics	4	1	0	5
UNIT- I:DIFFERENTIAL CALCULUS					15
Derivative of a function – Various formulae – Product and quotient rule of differentiation – Differentiation of function of function (chain rule) – Trigonometric functions – Inverse trigonometric functions – Exponential function – Logarithmic functions – Logarithmic differentiation - Higher derivatives – Successive differentiation – Liebnitz theorem.					
UNIT- II: INTEGRAL CALCULUS					15
Constant of integration – Indefinite integral – Elementary integral formulae – Methods of integration – Integration by substitution - Integration by parts - Integration through partial fractions – Concept of definite integral – Properties of definite integral					
UNIT- III: MATRICES AND DETERMINANTS					15
Definition and types of matrices – Matrix Operation – Determinants – Solution of system of linear equations by Matrix method.					
UNIT- IV: SERIES					15
Binomial theorem for a rational index – Exponential and Logarithmic series – Summation of the above series					
UNIT –V: TWO DIMENSIONAL ANALYTICAL GEOMETRY					15
Cartesian coordinate system – Introduction to polar coordinates – Distance between two points – Section formulae – Area of triangle – Locus and its equations – Straight line: Equation of a straight line parallel to an axis – slope form –normal form - Intercept form through two point - condition of concurrency of three lines.					
	LECTURE	TUTORIAL	PRACTICAL	TOTAL	
	60	15	0	75	
TEXT BOOKS					
1.T. K. Manicavachagom Pillay, T. Natarajan, K. S. Ganapathy, Algebra, Volume I , S.Vishvanathan Printers and Publishers Pvt., Ltd, Chennai 2004.					
2. S.Narayanan, T.K.Manicavachagam Pillay, S.Vishvanathan, Calculus volume I & II Printers and Publishers Pvt., Ltd, Chennai 2009,9th edition					
REFERENCES					

1. P.Kandasamy&K.Thilagavathi, B.Sc Mathematics for branch I – Vol I & Vol II, S.Chand& Co, 2004.

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1. Advanced Engineering Mathematics Prof. PratimaPanigrahi
2. Department of Mathematics Indian Institute of Technology, Kharagpur.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	1	0	0	1	0	1	0	0
CO 2	3	1	0	0	1	0	1	0	0
CO 3	3	1	0	0	1	0	1	0	0
CO 4	3	1	0	0	1	0	1	0	0
CO 5	3	1	0	0	1	0	1	0	0
Total	15	5	0	0	5	0	5	0	0
Course	3	1	0	0	1	0	1	0	0

0-No relation 3- Highly relation 2- Medium relation 1– Low relation

XCA105 COMPUTER ORGANIZATION AND ARCHITECTURE

Course Outcomes:

CO1 C Remember **Defines** basic number systems, Boolean expression

			simplification and logic gates manipulation
CO2	C	Understand	Explain the functions of various components in digital system
CO3	C	Understand	Describe general Instruction types, formats, addressing modes and organization
CO4	C	Understand	Summarize various modes of Data transfer and interface
CO5	C	Understand	Summarize memory organization and management

COURSE CODE	COURSE NAME	L	T	P	C
XCA105	COMPUTER ORGANIZATION AND ARCHITECTURE	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	Number system	4	0	0	4
UNIT –I:NUMBER SYSTEM AND BOOLEAN LOGIC					12
Introduction: Simple Computer Organization - Number System – Data Representation – Complements – Subtraction of unsigned numbers- Arithmetic Addition and Subtraction Boolean Algebra – Truth Tables -Logic Gates - Map Simplification- Other Binary codes- Error detection codes					
UNIT- II: COMBINATIONAL AND SEQUENTIAL CIRCUIT					12
Combinational Circuit - Half adder, Full Adder - Decoders – Multiplexer – Sequential circuit - Flip Flops: RS, JK, D, T Flip Flops – Excitation Table – Master / Slave Flip Flop- Registers – Counters.					
UNIT- III: INSTRUCTION FORMATS AND TYPES					12
Instruction codes -Components of CPU- General Register Organization – Instruction Format- Addressing Modes – Memory Reference Instructions – Data Transfer and Manipulation- Instruction – Shift Instruction.					
UNIT –IV: INPUT OUTPUT ORGANIZATION					12
Peripheral Devices – Input Interface – I/O Bus and Interface modules- Asynchronous Data Transfer – Modes of Transfer – Direct Memory Access.					
UNIT- V: MEMORY ORGANIZATION					12
Memory Hierarchy – Main Memory - Auxiliary Memory – Associative Memory- Cache – Virtual Memory.					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		60	0	0	60
1. M.Morris Mano “Computer System Architecture”, Pearson Education, Third Edition,2014.					
2. M.Morris Mano “Digital Logic and Computer Design”, Pearson Education, 2010.					
3. William Stallings, “Computer Organization and Architecture”, Tenth Edition, Pearson Education, 2015.					
REFERENCES					
1. Stallings, William. Computer organization and architecture : designing for performance / William Stallings. — Tenth edition. pages cm Includes bibliographical references and index. ISBN 978-0-13-410161-3 — ISBN 0-13-410161-8					
2. David A. Patterson, John L.Hennessy, “Computer Organization and Design”, Fourth Edition, Morgan Kauffmann Publishers, 2011.					

E REFERENCES

1. NPTEL, Computer Architecture, Prof. Anshul Kumar, Department of Computer Science & Engineering, IIT Delhi.
2. NPTEL, Digital Computer Organization by Prof.P.K. Biswas, Department of Electronics and Electrical Communication Engineering, IIT Kharagpur.
3. M.Morris Mano “Computer System Architecture”, Pearson Education, Third Edition,2014.
4. M.Morris Mano “Digital Logic and Computer Design”, Pearson Education, 2010.
5. William Stallings, “Computer Organization and Architecture”, Tenth Edition, Pearson Education, 2015.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	2	2
CO 2	3	3	2	2	2	1	1	2	2
CO 3	3	3	2	2	2	1	1	2	2
CO 4	3	2	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	1	1	2	2
Total	14	13	10	10	10	5	5	10	10
Course	3	3	2	2	2	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA106 C PROGRAMMING LABORATORY

Course Outcomes:

CO1 C Apply **Computes** various control statements and arrays

CO2	C	Apply	Solve an application program using various controls statements and arrays
CO3	C	Apply	Implement structures and unions Develop an application program using structures and unions
CO4	C	Apply	Implement the pointer concepts Develop an application program using structures and unions
CO5	C	Apply	Develop a program to create and process a file for different applications

COURSE CODE	COURSE NAME	L	T	P	C
XCA106	C PROGRAMMING - LABORATORY	0	0	1	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	0	0	2	2
1.Program to implement formatted I/O operations 2.Program to implement unformatted I/O operations 3.Program to implement control structures 4.Program to implement one dimensional and two-dimensional arrays 5.Program to implement calling the function through call by value method & call by reference 6.Program to implement Structures 7.Program to implement dynamic memory allocation 8.Program to implement pointer to function 9.Program to implement an array of pointers 10.Program to implement various file operations in a standard file 11.Program to implement various file operations in text file					

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	0	0	30	30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	2	2	1	1	1	1	2	1
CO 2	3	2	2	1	1	1	1	2	1
CO 3	3	2	2	1	1	1	1	1	1
CO 4	3	2	2	1	1	1	1	1	1
CO 5	2	2	2	1	1	1	1	1	1
Total	14	10	10	5	5	5	5	7	5
Course	3	2	2	1	1	1	1	2	1

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

COURSE CODE	XUM001	L	T	P	SS	C
COURSE NAME	HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY	1	0	0	1	1
PREREQUISITES	Not Required	L	T	P	SS	H

C:P:A	0.8:0.1:0.1		1 0 0 1 2
COURSE OUTCOMES		Domain	Level
CO1	<i>Relate</i> and <i>Interpret</i> the human ethics and human relationships	Cognitive	Remember, Understand
CO2	<i>Explain</i> and <i>Apply</i> gender issues, equality and violence against women	Cognitive	Understand, Apply
CO3	<i>Classify</i> and <i>Develop</i> the identify of women issues and challenges	Cognitive & Affective	Analyze Receive
CO4	<i>Classify</i> and <i>Dissect</i> human rights and report on violations.	Cognitive	Understand, Analyze
CO5	<i>List</i> and <i>respond</i> to family values, universal brotherhood, fight against corruption by common man and good governance.	Cognitive & Affective	Remember, Respond

UNIT I HUMAN ETHICS AND VALUES

3+3

HUMAN ETHICS AND VALUES

Human Ethics and values - Family and Society, Social service, Social Justice, Integrity, Caring and Sharing, Honesty and Courage, Time Management, Co-operation, Commitment, Sympathy and Empathy, Self respect, Self-Confidence, Personality Development

UNIT II GENDER EQUALITY

3+3

Gender Discrimination in society and in family, Gender equity, equality, and empowerment. Social and Economic Status of Women in India in Education, Health, Employment, Definition of HDI, GDI and GEM. Contributions of Dr.B.R. Ambedkar, Thanthai Periyar and Phule to Women Empowerment.

UNIT III WOMEN ISSUES AND CHALLENGES

3+3

Women Issues and Challenges- Female Infanticide and Feticide, Violence against women, Domestic violence, Sexual Harassment, Trafficking, Remedial Measures – Acts related to women: Political Right, Property Rights, and Rights to Education, Dowry Prohibition Act.

UNIT IV HUMAN RIGHTS

3+3

Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economical, Social and Cultural Rights, Rights against torture, Forced Labour, Child helpline- Intellectual Property Rights (IPR) and its types. National Policy on occupational safety and health.

UNIT V GOOD GOVERNANCE

3+3

Good Governance - Democracy, People's Participation, Transparency in governance and audit, Corruption, Impact of corruption on society and Remedial measures, Government system of Redressal. Creation of People friendly environment and universal brotherhood.

LECTURE

SELF STUDY

TOTAL

15

15

30

REFERENCES

1. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
2. Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).
3. Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).
4. Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).
5. Kaushal, Rachna, Women and Human Rights in India (New Delhi: Kaveri Books, 2000)
6. Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human

Rights, 1998).

7. Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).
8. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
9. Veeramani, K. (ed) Periyar Feminism, (Periyar Maniammai University, Vallam, Thanjavur: 2010).
10. 10.Planning Commission report on Occupational Health and Safety
http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p
11. Central Vigilance Commission (Gov. of India) website: <http://cvc.nic.in/welcome.html>.
12. Weblink of Transparency International: <https://www.transparency.org/>
13. Weblink Status report: <https://www.hrw.org/world-report/2015/country-chapters/india>

Table 1 : Mapping of COs with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								2						
CO2								3	1					
CO3								2						
CO4								3		2				
CO5								3	2	2		2		
Total		2						13	3	4		2		
Scaled Value		1						3	1	1		1		

1 – 5 → 1, 6-10 → 2, 11 – 15→ 3

0 – No relation, 1 – Low relation, 2 – Medium relation, 3 – High relation

XCA203 OBJECT ORIENTED PROGRAMMING WITH C++

Course Outcomes:

CO1	C	Remember	Recall the basic concepts on object-oriented programming
CO2	C	Understand	Defends the classes and objects with array and functions.
CO3	C	Understand	Explain the types of inheritances and operator Overloading functions
CO4	C	Apply	Apply the concept of Polymorphism
CO5	C	Understand	Define and Explain file concept and exception handlings in C++

COURSE CODE	COURSE NAME	L	T	P	C
XCA203	OBJECT ORIENTED PROGRAMMING WITH C++	4	0	0	4
C:P:A =4:0:0					
PREREQUISITE	C Programming	4	0	0	4
UNIT- I: INTRODUCTION TO C++				12	
key concepts of Object-Oriented Programming – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If, else, jump, goto, break, continue, Switch case statements - Loops in C++ : For, While, Do.					
UNIT- II: CLASSES AND OBJECTS				12	
Declaring Objects, classes - Static Member variables. Arrays – Characteristics – array of classes - array of objects. Functions in C++ - Defining Member Functions - Inline functions – Function Overloading - Constructor and destructor - friend functions.					
UNIT- III: OPERATOR OVERLOADING AND INHERITANCE				12	
Overloading unary, binary operators– type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.					
UNIT-IV: POINTERS AND POLYMORPHISM				12	
Declaration – Pointer to Class, Object – this pointer – Pointers to derived classes and Base classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism -Compile time polymorphism - Run time polymorphism.					
UNIT- V: EXCEPTION HANDLING AND FILES				12	
Exception Handling - File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access File Operation.					
		LECTURE	PRACTICAL	TUTORIAL	TOTAL
		60	0	0	60
TEXT					
1. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, 2014.					
2. Stanley B. Lippman, JoseeLajoie andBarbara E. Moo, “The C++ Primer”, Addison Wesley, 2013, Fifth Edition.					
REFERENCES					
1. E. Balagurusamy, OBJECT-ORIENTED PROGRAMMING WITH C++, Tata McGraw Hill Education Private Limited ,2011,fifthth edition					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	2	3	2	2	2	1	2	2	2
CO 5	3	2	2	2	2	1	2	2	2
Total	14	13	10	10	10	5	10	13	13
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA204 - DISCRETE MATHEMATICS

Course Outcomes:

CO1 C Remember, *Define* the properties and laws of sets, relations and functions.

	A	Respond to phenomena	Participate in the class discussion in the operation of set using venn Diagram.
CO2	C	Understand	Explain the basic concepts of logic to calculate the normal forms, tautologies and contradiction.
CO3	C	Apply	Apply the counting principle permutation and combination and pigeonhole principle to solve the problem.
	P	Guided Response	Reproduce model related to counting principle
CO4	C	Remember, Understand	Explain the types of lattices and to show lattices as partially ordered sets.
CO5	C	Understand	Explain the properties of semi groups and groups and any set with binary operation as a semigroup and group with examples.

COURSE CODE	COURSE NAME
XCA204	DISCRETE MATHEMATICS
C:P:A =4.5:0.25:0.25	
PREREQUISITE	Basic Mathematics
UNIT- I: SET OPERATIONS	
Set notations – Basic definitions and set operations – Venn diagram – Algebraic laws of set theory – D M Equivalence classes. Functions: Definition – Domain – Range and types of function- Classification of function.	
UNIT- II: NORMAL FORMS	
Statements - Normal forms – CNF – DNF – PCNF - PDN – Tautologies - Contradictions.	
UNIT – III: PERMUTATION AND COMBINATION	
Counting principles – The Pigeonhole principle – Counting – Permutations and Combinations – Combinatorial a	
UNIT- IV: LATTICES	
Lattices as partially ordered set – Types of lattices – Lattices as algebraic system.	
UNIT- V: GROUPS	
Binary operations – Semi groups - Groups – Examples and elementary properties.	
TEXT	
<ol style="list-style-type: none"> 1. Ralph. P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, 2. Kenneth Levasseur and Alan Doerr, “Applied Discrete Structures, Department of Mathematical Sciences, 	
REFERENCES	
<ol style="list-style-type: none"> 1. Kenneth H.Rosen, “Discrete Mathematics and its Application”, Fifth edition, Tata McGraw-Hill Publishing 2. Kenneth H.Rosen, "Discrete Mathematics and its Applications: With Combinatorics and Graph Theory", Ta 3. Dr.M.K.Venkataraman, Dr.N.SridharanN.Chandrasekaran, “Discrete Mathematics”, the National Publishing 4. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics, 10th edition,Tata McGraw Hill. 	
E REFERENCES	
<ol style="list-style-type: none"> 1. Graph Theory A NPTEL Course, S.A. Choudum. 2. Graph Theory by Prof. L. Sunil Chandran, Computer Science and Automation Indian Institute of Science 	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	0	0	0	1	0	1	0	0
CO 2	3	1	0	0	1	0	1	0	0
CO 3	3	1	0	1	1	0	1	0	0
CO 4	3	0	0	0	1	0	1	0	0
CO 5	3	1	0	0	1	0	1	0	0
Total	15	3	0	1	5	0	5	0	0
Course	3	1	0	1	1	0	1	0	0

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA205 COMPUTER NETWORKS

Course Outcomes:

- | | | | |
|-----|---|----------|--|
| CO1 | C | Remember | <i>Define</i> the OSI reference model used in the network |
| CO2 | C | Remember | <i>Describe</i> the DLL services and different protocols |
| CO3 | C | Remember | <i>Recognize</i> the various routing algorithms |
| CO4 | C | Remember | <i>Recognize</i> the transport layer and the congestion control algorithm. |
| CO5 | C | Remember | <i>Identify</i> the application layer and the naming service. |

COURSE CODE	COURSE NAME
XCA205	COMPUTER NETWORKS

C:P:A =3:0:0	
PREREQUISITE	Basic Computer Fundamentals
UNIT-I : OVERVIEW OF COMPUTER NETWORKS	
Network hardware- Network software- Protocol Hierarchies – Layering – Interfaces, services, primitives – C Wireless transmission – switching.	
UNIT – II : DATA LINK LAYER	
Services of DLL – Framing – Flow control – Error control – Error detection codes – Error correction codes – internet	
UNIT-III: NETWORK LAYER	
Services of Network Layer - Routing – Shortest Path Routing Algorithm – Congestion Control – General Pr protocol –IP address – subnets – internet control protocol	
UNIT- IV : TRANSPORTATION LAYER	
Services of Transportation Layer – Addressing –Establishing and Releasing Connection – Flow Control – E Connection Management – TCP Congestion Control.	
UNIT- V: APPLICATION LAYER	
DNS – Name Space –Resource – Records – Name Servers - Email – Architecture and Services – User Agent Sides – Locating Information on the Web	
TEXT	
1. Andrew Tanenbaum , Computer Networks, PHI, 3rd Edition. 2. Larry Peterson and Bruce Davie, Computer Networks: A Systems Approach, 4th Ed. 2007.	
REFERENCES	
1. William Stalling,Computer networks – PHI	
E REFERENCES	
1. http://nptel.ac.in/courses/106105081/ 2. Computer Network Topology, Prof.Sujoy Gosh, http://nptel.ac.in/video.php?subjectId=106105081	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	3	2
CO 2	3	3	2	2	2	1	1	3	2
CO 3	3	3	2	2	2	1	1	3	2
CO 4	3	2	2	2	2	1	1	3	2
CO 5	2	2	2	2	2	1	1	3	2
Total	14	13	10	10	10	5	5	15	10
Course	3	3	2	2	2	1	1	3	2

0-No relation 3- Highly relation 2- Medium relation 1– Low relation

XCA206 DATA STRUCTURES AND ALGORITHMS

Course Outcomes:

CO1	C	Understand	Understand the classification of data types and operations of stack.			
CO2	C	Understand	Understand the functions of queue and its types			
CO3	C	Understand	Describe the operations of linked list and its advantages			
CO4	C	Understand	Recall the recursion function in various problems			
CO5	C	Understand	Apply the concepts of tree and sorting			
COURSE CODE	COURSE NAME		L	T	P	C
XCA206	DATA STRUCTURES AND ALGORITHMS		4	0	0	4
C:P:A = 4:0:0						
			L	T	P	H
PREREQUISITE	Nil		4	0	0	4
UNIT- I: INTRODUCTION TO DATA STRUCTURES AND STACK					12	

Definition, Classification of data structures: primitives and non primitive, Operations on data structures – Definition, Array & Linked list representation of stack, Operations on stack, Applications of stacks, Infix, Prefix and Postfix notations – Conversion of an arithmetic expression from infix to postfix.				
UNIT –II: QUEUE				12
Definition, Array & Linked list representation of queue – Types of Queues: Simple queue, Circular queue, Double ended queue, Priority queue, Operations on all types of queues.				
UNIT- III: LINKED LIST				12
Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list and Circularly doubly linked list. Operations on singly linked list : creation, insertion, deletion, search and display.				
UNIT- IV: RECURSION				12
Definition, Recursion in C, writing recursive programs – Binomial coefficient, Fibonacci, GCD, Factorial etc.				
UNIT- V: TREE AND SORTING TECHNIQUES				12
Tree, Binary Tree, Complete Binary Tree, Binary Search Tree, Heap Tree Terminology: Root, Node, Degree of a Node And Tree, Terminal Nodes, Non-Terminal Nodes, Siblings, Level, Edge, Path, Depth, Parent Node, Ancestors of a Node. Different Types of Searching Techniques: Bubble Sort, Selection Sort, Merge Sort, Insertion – Quick Sort.				
	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	60	0	0	60
TEXT				
1. A.K. Sharma, "Data Structures using C", Pearson Education, 2013 2. Robert L. Kruse "Data Structures and Program Design in C, Pearson Education, 2013				
REFERENCES				
1. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005 2. Aaron M. Tanenbaum, Moshe J. Augenstein and YedidyahLangsam, "Data structures using C and C++", Prentice Hall, 2012. 3. Michael T. Goodrich, Roberto Tamassia and David Mount, “ Data Structures and Algorithms in C++”, John Wiley, 2011.				
E REFERENCES				
1. NPTEL, Data structures and algorithm ,Prof. Hema A Murthy,IITMadras,Prof. Shankar Balachandran,IITMadras,Dr. N S. Narayanaswamy,IIT Madras 2. NPTEL, Data structures and algorithm ,Prof. Naveen Garg,IIT Delhi				

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	3	2

CO 5	3	2	2	2	2	1	2	3	2
Total	15	13	10	10	10	5	10	15	13
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA207 OBJECT ORIENTED PROGRAMMING WITH C++- LABORATORY

Course Outcomes:

CO1	C	Apply	Apply structure and inline functions
CO2	C	Apply	Applying various levels of Inheritance for real time problems Apply the OOPs concepts class and object
CO3	C	Apply	Apply various overloading methods for different applications
CO4	C	Apply	Apply and implement operator overloading functions
CO5	C	Apply	Apply and implement file operations

COURSE CODE	COURSE NAME	L	T	P	C
XCA207	OBJECT ORIENTED PROGRAMMING WITH C++ LABORATORY	0	0	1	1
C:P:A =1:0:0					
		L	T	P	H

PREREQUISITE	C Programming Laboratory								0	0	2	2
<ol style="list-style-type: none"> 1. Implement Various Control Structures. 2. Demonstrate Inline Functions 3. Implement Structure & Unions 4. Implement Class and Subclass 5. Demonstrate Constructors & Destructors. 6. Programs to Implement Friend Function 7. Implement Multilevel Inheritance 8. Implement Multiple Inheritance with Access Specifiers 9. Implement Hierarchical inheritance 10. Programs to Overload Unary & Binary Operators 11. Program to implement file operations 												
					LECTURE		PRACTICAL		TUTORIAL		TOTAL	
					0		30		0		30	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2			
CO 1	3	3	2	2	2	1	2	3	3			
CO 2	3	3	2	2	2	1	2	3	3			
CO 3	3	2	2	2	2	1	2	3	3			
CO 4	2	3	2	2	2	1	2	2	2			
CO 5	3	2	2	2	2	1	2	2	2			
Total	14	13	10	10	10	5	10	13	13			
Course	3	3	2	2	2	1	1	3	3			

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA208 DATA STRUCTURES AND ALGORITHMS – LABORATORY

Course Outcomes:

CO1	C	Apply	Computes a program to implement the operations of stack.									
CO2	C	Apply	Computes a program to implement the operations of queue.									
CO3	C	Apply	Computes an application to demonstrate the functions of linked list									
CO4	C	Apply	Computes an application in C for traversing a tree and sorting concept.									
CO5	C	Apply	Solve the problem with different searching algorithms.									
COURSE CODE			COURSE NAME						L	T	P	C
XCA208			DATA STRUCTURES ANDALGORITHMS – LABORATORY						0	0	1	1
C:P:A = 1:0:0												
									L	T	P	H
PREREQUISITE			C++ Programming						0	0	2	2
Lab:												
<ol style="list-style-type: none"> 1. Create a Stack and do the following operations using array 2. (i)Push (ii) Pop (iii) Peep 3. Create a Queue and do the following operations using array(i)Add (ii) Remove 												

<ol style="list-style-type: none"> 4. Implement the operations on singly linked list. 5. Implement the following operations on a binary search tree. <ol style="list-style-type: none"> a. (i) Insert a node (ii) Delete a node 6. Create a binary search tree and do the following traversals <ol style="list-style-type: none"> a. (i) In-order (ii) Pre order (iii) Post order 7. Sort the given list of numbers using insertion sort 8. Sort the given list of numbers using quick sort. 9. Perform the following operations in a given graph <ol style="list-style-type: none"> (i) Depth first search (ii) Breadth first search 										
				LECTURE	PRACTICAL			TUTORIAL	TOTAL	
				0	30			0	30	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	
CO 1	3	3	2	2	2	1	2	3	3	
CO 2	3	3	2	2	2	1	2	3	3	
CO 3	3	2	2	2	2	1	2	3	3	
CO 4	3	3	2	2	2	1	2	3	2	
CO 5	3	2	2	2	2	1	2	3	2	
Total	15	13	10	10	10	5	10	15	13	
Course	3	3	2	2	2	1	1	3	3	

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

COURSE CODE		COURSE NAME				L	T	P	SS	C	H
XUM002		ENVIRONMENTAL STUDIES				1	0	0	1	1	2
C:P:A = 0.7: 0 : 0.3											
COURSE OUTCOMES- On the successful completion of the course, students will be able to						DOMAIN		LEVEL			
CO1	<i>Describe</i> the significance of natural resources and <i>explain</i> anthropogenic impacts.					Cognitive		Remember Understand			
CO2	<i>Illustrate</i> the significance of ecosystem, biodiversity and natural geobio chemical cycles for maintaining ecological balance.					Cognitive		Understand			
CO3	<i>Identify</i> the facts, consequences and apply the preventive measures of major pollutions and <i>recognize</i> and the disaster phenomenon.					Cognitive Affective		Apply Receiving			
CO4	<i>Explain</i> the socio-economic, policy dynamics and <i>practice</i> the control measures of global issues for sustainable development.					Cognitive		Understand Analyse			
CO5	<i>Recognize</i> the impact of population and the concept of various welfare programs, and explain the modern technology towards environmental protection.					Cognitive		Understand			
UNIT - I NATURAL RESOURCES AND ENERGY									3+3		
World Environment Day and its need- Forest resources: Use, Deforestation- Water resources: over-utilization of surface and ground water- Mineral resources: Environmental effects of mining- Food resources: Modern agriculture, Fertilizer-Pesticide problems, Water logging, Salinity-Energy resources: Renewable and Non-renewable energy sources; Alternate energy resources-Role Of individual in Conservation of Resources.											
UNIT – II ECOSYSTEMS AND BIODIVERSITY									3+3		

Table:1 Mapping of CO's with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	0	0	0	0	0	0	0
CO2	2	0	0	0	0	2	1	0
CO3	2	1	3	0	0	3	1	0
CO4	1	1	2	0	0	3	2	3
CO5	2	1	1	0	0	3	0	0
	10	3	6	0	0	11	4	3
Scaled to 0,1,2,3 scale	2	1	2	0	0	3	1	1

1 - Low, 2 – Medium, 3 – High

XCA304 HTML AND DHTML

Course Outcomes:

CO1	C	Remembering	<i>List</i> out the tags of Text Formatting and Tables			
CO2	C	Understanding	<i>Demonstrate</i> the List, Links and Images.			
CO3	C	Apply	<i>Explain</i> Frames in HTML for developing the webpage			
CO4	C	Understanding	<i>Explain and Develop</i> static web page with HTML form			
CO5	C	Understanding	<i>Explain</i> DHTML with Java script and CSS			
COURSE CODE	COURSE NAME		L	T	P	C
XCA304	HTML AND DHTML		1	0	0	1
C:P:A = 1:0:0						
			L	T	P	H
PREREQUISITE	Basic Computer Fundamentals		1	0	0	2
UNIT- I: INTRODUCTION TO HTML					5	
Designing a Home Page – HTML Document –Anchor Tag – Hyperlinks – Head and Body Sections – Header Section – Title – Prologue – Links – Colorful Pages – Comments – Body Section – Heading – Horizontal Ruler – Paragraph – Tabs – Images and Pictures – Lists and their Types – Nested Lists– Table Handling.						
UNIT- II: FRAMES AND FORMS					5	
Frames: Frameset Definition – Frame Definition – Nested Framesets – HTML and other Media types - Forms: Forms and their Elements.						
UNIT – III : DHTML					5	
Document Object Model – HTML and Scripting Access – Rollover Buttons – Moving objects with DHTML – Ramifications of DHTML– Introduction to java script – Fundamentals of CSS.						
			LECTURE	PRACTICAL	TOTAL	
			15	0	15	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
--	-----	-----	-----	-----	-----	-----	-----	-------	-------

CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	2	3	2	2	2	1	2	2	3
CO 5	3	2	2	2	2	1	2	2	3
Total	14	13	10	10	10	5	10	13	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA305 DATABASE MANAGEMENT SYSTEMS

Course Outcomes:

CO1	C	Remember	<i>Describe</i> the database architecture and its applications
CO2	C	Remember	<i>Discuss</i> about the relational algebra and calculus
CO3	C	Remember	<i>Describe</i> the various normalization forms
CO4	C	Remember	<i>Describe</i> the storage and accessing of data.
CO5	C	Remember	<i>Define</i> the query processing in database management.

COURSE CODE	COURSE NAME	L	T	P	C
XCA305	DATABASE MANAGEMENT SYSTEMS	3	0	0	3
C:P:A = 3: 0: 0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	3	0	0	3
UNIT- I : DATABASE ARCHITECTURE AND ER DIAGRAM					9
Introduction, History, purpose and applications of Database - View of data- Database languages - Database architecture - Database users and administrators - History of database systems-Entity relationship modeling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, sub classes; super classes, inheritance, specialization and generalization					
UNIT- II: RELATIONAL DATA MODEL					9
Relational model concepts, Relational constraints, Relational Languages : Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - SQL: Basic Structure-Set Operations- Aggregate Functions-Nested Sub Queries-Views -Modification Of Database-Joined Relations.					
UNIT – III: DATA NORMALIZATION					9
Pitfalls in relational database design – Decomposition – Functional dependencies – Normalization – First normal form – Second normal form – Third normal form – Boyce-code normal form – Fourth normal form – Fifth normal form					
UNIT- IV: STORAGE AND FILE ORGANIZATION					9
Disks - RAID -Tertiary storage - Storage Access -File Organization – organization of files -					

Data Dictionary storage			
UNIT- V: QUERY PROCESSING AND TRANSACTION MANAGEMENT			9
Query Processing - Transaction Concept - Concurrency Control –Locks based protocol-Deadlock Handling			
	LECTURE	TUTORIAL	PRACTICALS
	45	0	0
	TOTAL		45
TEXT			
1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010.			
2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition, 2002			
REFERENCES			
1. Bipin Desai, An Introduction to database systems, Galgotia Publications, 2010.			
2. RamezElamassri, Shankant B-Navathe, Fundamentals of Database Systems, Pearson, 7 th Edition, 2015			
E REFERENCES			
1. NPTEL, Introduction to database design, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras			
2. NPTEL, Indexing and Searching Techniques in Databases, Dr. Arnab Bhattacharya, IIT Kanpur			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	3	3
CO 5	3	2	2	2	2	1	2	3	3
Total	15	13	10	10	10	5	10	15	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA306 VISUAL PROGRAMMING

Course Outcomes:

CO1	C	Knowledge	<i>Quote</i> basic controls and events
CO2	C	Knowledge	<i>Describe</i> various controls for different applications
CO3	C	Knowledge	<i>Describe</i> intrinsic and extrinsic controls in programming
CO4	C	Knowledge	<i>Describe</i> connections and operations in database
CO5	C	Knowledge	<i>Recite</i> various VC++ controls & events

COURSE CODE	COURSE NAME
XCA306	VISUAL PROGRAMMING
C:P:A = 3:0:0	
PREREQUISITE	Basic Computer Fundamentals
UNIT- I: INTRODUCTION ON WINDOWS PROGRAMMING	
Overview of Windows Programming - Event driven programming – GUI concepts - Data Types – Resources – window – displaying the window - Text Output	
UNIT- II: VISUAL BASIC PROGRAMMING	
Introduction – Forms – Variables, Types – Properties, methods, events – Decision Making – Looping – Select Responding to mouse events – Drag and drop events Responding to keyboard events – KEYPRESS, KEYUP, K	
UNIT- III: ADVANCED CONTROLS	
Menu bar - Tool bar - Message box - Input box - Dialog box - MDI – Tree view – List view – Tab strip - Objects - Projects with Multiple Forms - Do Events and Sub Main - Error Trapping	
UNIT- IV: ODBC AND DATABASE ENGINES	
Database Manager – Data Control – Record set Objects – DAO – Manipulation of records – Database Managem	
UNIT- V: VISUAL C++	
VC++ Components – MFC - Resources – Getting started with AppWizard – Class Wizard - Modal and Modeles	

TEXT

1. Charles Petzold, " Programming Windows", 6th Edition, 2012, Microsoft Press
2. David I. Schneider , " Introduction to Programming Using Visual Basic", University of Maryland, Pearson, 1

REFERENCES

1. David I. Schneider, Introduction to Programming with Visual Basic 6.0, 4th Edition, 2003, Prentice Hall
2. Avanija J, Visual Programming, 3rd Edition, 2009, Anuradha Publications.

E REFERENCES

1. NPTEL, Dr.S.Arunkumar, Department of Computer Science and Engineering, IIT Delhi
2. Microsoft Visual C++: Make a Windows Forms Application by Alexanderrockandroll

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	3	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	3	3
CO 5	3	3	2	2	2	1	2	3	3
Total	15	15	10	10	10	5	10	15	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA307 STATISTICAL AND NUMERICAL METHODS

Course Outcomes:

- CO1 C Remember *Explain* the statistical data in the form of table, diagram and graph and Understand to *find* various statistics, correlation, rank correlation and regression coefficients.
- CO2 C Remember *Define* null and alternate hypothesis and to *Apply* test statistic.
Apply
- CO3 C Remember *Define* discrete and continuous random variables and to *Find* the expected values and moment generating functions of discrete and continuous distributions.
- CO4 C Understand *Explain* computational numerical methods to *Solve* algebraic and Apply transcendental equations and systems of linear equations.
- CO5 C Apply *Solve* the Numerical Differentiation and Integration and to *Apply the* Trapezoidal and Simpson's rules.

COURSE CODE	COURSE NAME	L	T	P	C
XCA307	STATISTICAL AND NUMERICAL METHODS	3	1	0	4
C:P:A = 4:0:0		L	T	P	H
PREREQUISITE	Basic Mathematics	3	1	0	4
UNIT- I: MEASURES OF CENTRAL TENDENCY					12
Diagrammatic and graphical representation of data. Mean Median and mode, Range and standard deviation. Karl Pearson's Coefficient of Correlation, Rank correlation, Regression – Regression coefficients, Regression Equations.					
UNIT- II: TESTING OF HYPOTHESIS					12
Sampling distributions - Tests for single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – χ^2 -test for goodness of fit – Independence of attributes.					
UNIT- III: PROBABILITY DISTRIBUTIONS					12
Sample space - Events - Definition of probability - conditional probability and independent events- Random variables, distributions and Mathematical expectations. Discrete distributions - Binomial – Poisson. Continuous distribution – Normal.					
UNIT- IV: NUMERICAL SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS					12
Numerical solution of Algebraic & Transcendental Equations - Bisection method – Newton Raphson method. Numerical solution of Simultaneous Linear Algebraic Equation – Gauss Elimination method – Gauss Jordan Elimination method – Gauss Seidel method and Gauss –					

Jacobi method.			
UNIT- V: NUMERICAL DIFFERENTIATION AND INTEGRATION			12
Numerical Differentiation - Newton's Forward difference formula and backward difference formula. Numerical Integration – Trapezoidal rule - Simpson's One-third rule – Simpson's three - eighth rule.			
	LECTURE	TUTORIAL	TOTAL
	45	15	60
TEXT BOOKS			
1. S. C. Gupta, V. K. Kapoor, "Fundamental of Mathematical Statistics" ,Sultan Chand & Sons ,Eleventh Edition, 2014			
2. P. Kandasamy , K. Thilagavathi, K. Gunavathi, Numerical Methods, S. Chand & company Ltd. New Delhi Revised Edition, 2005.			
REFERENCES			
1. V. Rajaraman , Computer oriented numerical methods , PHI Publication, 2013.			
2. E. Balagurusamy, Numerical methods ,copyright 1999 by Tata MC Graw Hill,25 th Reprint, 2008			
E REFERENCES			
1. Elementary Numerical Analysis, Prof. Rekha P. Kulkarni. Department of Mathematics, Indian Institute of Technology, Bombay.			
2. Advanced Engineering Mathematics, Prof. Somesh Kumar, Department of Mathematics, Indian Institute of Technology, Kharagpur.			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO2
CO 1	3	1	0	0	1	0	1	0	0
CO 2	3	1	0	0	1	0	1	0	0
CO 3	3	1	0	0	1	0	1	0	0
CO 4	3	1	0	0	1	0	1	0	0
CO 5	3	1	0	0	1	0	1	0	0
Total	15	5	0	0	5	0	5	0	0
Course	3	1	0	0	1	0	1	0	0

0-No relation 3- Highly relation 2- Medium relation 1– Low relation

XCA308 HTML AND DHTML LABORATORY

Course Outcomes:

CO1	C	Apply	<i>Apply</i> to work with Text Formatting tags
CO2	C	Apply	<i>Apply</i> the web site with List, Links and Images. <i>Selects</i> the necessary tag used for designing the website.
CO3	C	Apply	<i>Organize</i> all the web sites linked with Frames
CO4	C	Apply	<i>Calculate</i> static web page with HTML form elements
CO5	C	Apply	<i>Sketch</i> with CSS, Java Script and DHTML, Dynamic web pages with static webpages

COURSE CODE	COURSE NAME	L	T	P	C
XCA308	HTML AND DHTML-LABORATORY	0	0	1	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	0	0	2	2
				30	
Lab: 1. Design a webpage using HTML Text formatting and List tags. 2. Design a webpage using HTML Tables and images. 3. Create a document with links which connects an external document. 4. Design a web page using images and Media types 5. Create an E-Learning document using Frames. 6. Design a Login Web page using HTML Forms. 7. Design a web page using DHTML filter concept. 8. Create a web page to perform the addition of two numbers using java script. 9. Design a web page with CSS.					
		LECTURE	TUTORIAL	PRACTICALS	TOTAL
		0	0	30	30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	2	3	2	2	2	1	2	2	3
CO 5									

	3	2	2	2	2	1	2	2	3
Total	14	13	10	10	10	5	10	13	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA309 DATABASE MANAGEMENT SYSTEMS - LABORATORY

Course Outcomes:

CO1	C	Apply	<i>Sketch</i> the ER diagram for real world applications <i>Uses</i> various ER diagram for a similar concepts from various sources
CO2	C	Apply	<i>Generalize</i> various queries in SQL and PL/SQL <i>Solve</i> various queries in SQL, Relational Calculus and Algebra
CO3	C	Apply	<i>Apply</i> the normalization concepts for a table of data <i>Practices</i> a table and implement the normalization concepts
CO4	C	Apply	<i>Apply</i> the cursor concept by develop queries <i>Practices</i> PL/SQL Procedure using cursor
CO5	C	Apply	<i>Apply</i> the PL/SQL function <i>Practices</i> PL/SQL Procedure using function

COURSE CODE	COURSE NAME	L	T	P	C
XCA309	DATABASE MANAGEMENT SYSTEMS- LABORATORY	0	0	1	1
C:P:A = 1: 0: 0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	0	0	2	2
					30
Lab : 1. Execute a single line query and group functions. 2. Execute DDL Commands. 3. Execute DML Commands 4. Execute DCL and TCL Commands. 5. Implement the Nested Queries. 6. Implement Join operations in SQL 7. Create views for a particular table 8. Implement Locks for a particular table. 9. Write PL/SQL procedure for an application using exception handling. 10. Write PL/SQL procedure for an application using cursors. (As per Industry Expert Recommendation- Mr.J.Sengathir) 11. Write a PL/SQL procedure for an application using functions					

12. Write a PL/SQL procedure for an application using package (As per Industry Expert Recommendation- Mr.J.Sengathir)

	LECTURE	TUTORIAL	PRACTICALS	TOTAL
	0	0	30	30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	3	3
CO 5	3	2	2	2	2	1	2	3	3
Total	15	13	10	10	10	5	10	15	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA310 VISUAL PROGRAMMING LABORATORY

Course Outcomes:

CO1	C	Apply	Recognize event handlers for VB form
CO2	C	Apply	Recognize Various controls for different applications
CO3	C	Apply	Apply intrinsic and extrinsic controls in programming
CO4	C	Apply	Apply the Database concepts for the Real time applications
CO5	C	Apply	Apply various controls for Menu and Tool bar

COURSE CODE		COURSE NAME					L	T	P	C
XCA310		VISUAL PROGRAMMING LABORATORY					0	0	1	1
C:P:A = 1:0:0										
PREREQUISITE		Basic Computer Fundamentals					0	0	2	2
LAB									30	
<ol style="list-style-type: none"> 1. Design a form and event handler for keyboard & mouse events 2. Visual Basic code to calculate simple and compound interest 3. Design a scientific calculator using control array 4. Design a form in visual basic for free hand writing 5. Design a simple MDI Text Editor in visual Basic 6. Design a Digital Clock in Visual Basic 7. Write a visual basic code for creating simple applications with file system controls 8. Create, Update and Manipulate a content in Database 9. Create a code for drawing various two dimensional objects 10. Design a code for displaying Message Box 11. Design a code to manipulate Menu bar applications 12. Design a code to manipulate Tool bar applications 										
						0	0	30	30	
						LECTURE	TUTORIAL	PRACTICAL	TOTAL	
						0	0	30	30	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	
CO 1	3	3	2	2	2	1	2	3	3	
CO 2	3	3	2	2	2	1	2	3	3	

CO 3	3	3	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	3	3
CO 5	3	3	2	2	2	1	2	3	3
Total	15	15	10	10	10	5	10	15	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA403 DATA ANALYTICS

Course Outcomes:

CO1	C	Remember	<i>Describe</i> Data Management in Worksheet
CO2	C	Remember	<i>Define</i> Formulas in an Excel Spread sheet
CO3	C	Remember	<i>Recite</i> Statistical and Mathematical functions for given
CO4	C	Remember	<i>Describe</i> the type of charts to analyse the data
CO5	C	Remember	<i>Recite</i> Analysis Toolpak for statistical concepts

COURSE CODE	COURSE NAME
XCA403	DATA ANALYTICS
C:P:A = 1:0:0	
PREREQUISITE	Basic Computer Fundamentals
UNIT -I: INTRODUCTION TO WORKSHEET	
Getting Started with Excel: Excel and Spread Sheets – Excel Workbooks and Worksheets – Worksheet Cells - Querying Data – Importing Data from Databases.	
UNIT- II: DATA ANALYSIS IN CHARTS	
Working with Charts: Excel Charts – Scatter Plots – Editing a chart – Identifying Data Points: Creating Bubble P	
UNIT- III: STATISTICAL ANALYSIS	
Describe Data: Variables and Descriptive Statistics - Frequency Tables : Creating a Frequency Table – Using B – Percentiles and Quartiles – Measures of the Center: Means, Medians and the Mode – Measures of Variability –	
TEXT	
1. Kenneth N.Berk& Patrick Carey, “Data Analysis with Microsoft Excel”, 3 rd Edition. 2. John Walkenbach, “Microsoft Office Excel 2007”, Wiley Publishing Inc., 2007.	
REFERENCES	

1. Curtis Frye, “Step by Step Microsoft Office Excel 2007”, First Edition, Microsoft Press.
2. Marg, Craig Stinson, “Microsoft Office Excel 2007 inside and outside”, First Edition, Microsoft Press.

E REFERENCES

- 1.NPTEL, Dr.NandanSudarsanam, Dr.BalaramanRavindran, IIT, “Introduction to Data Analytics”.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	2	2
CO 5	3	2	2	2	2	1	2	2	2
Total	15	13	10	10	10	5	10	13	13
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA405 JAVA PROGRAMMING

Course Outcomes:

CO1	C	Understand	<i>Explain</i> the history and features of java
CO2	C	Understand	<i>Distinguish</i> the class, packages and interfaces
CO3	C	Understand	<i>Interpret</i> the inheritance concepts
CO4	C	Understand	<i>Demonstrate</i> the various types of exception and its handling methods
CO5	C	Understand	<i>Distinguish</i> the Applets methods in Graphics, AWT controls and event handling

COURSE CODE	COURSE NAME	L	T	P	C
XCA405	JAVA PROGRAMMING	3	0	0	3
C:P:A = 3:0 :0					
		L	T	P	H
PREREQUISITE	C++ Programming	3	0	0	3
UNIT- I: INTRODUCTION					9
Introduction to Java-Java and Internet-Byte codes-Features of Java-Java Development Environment- Java History -Java Development Kit (JDK)-Java Tokens-Java Character set-data types-operators-expressions-Java Statements-control statements-Simple programs- Array and Vectors-Strings and String Buffers.					
UNIT- II: CLASSES, INTERFACES AND PACKAGES					9
Classes-Objects-Wrapper Classes-Packages and Interfaces-extending interfaces-implementing interfaces-abstract methods.					
UNIT- III: INHERITANCE					9
Inheritance Extending classes-overriding methods-finalize methods-Abstract and Final classes-Interfaces and Inheritance.					
UNIT- IV: EXCEPTION HANDLING					9
Error Handling and Exception Handling-Exception Types and Hierarchy-Try Catch blocks-Use of Throw, Throws and Finally- Programmer Defined Exceptions.					
UNIT- V: APPLETS, GRAPHICS AND FILES					9
Fundamentals of Applets-Graphics. AWT and Event Handling: AWT components and Event Handlers-AWT Controls and Event Handling Types and Examples-Swing- Introduction. Input and Output: Files – Streams. Multithreading.					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		45	0	0	45

TEXT

- 1.E. Balagurusamy , "Programming With Java ", Tata Mcgraw Hill Education Private Limited, 4th Edition, 2009
- 2. Y. Daniel Liang, "Introduction to java programming", Pearson Publication, Tenth Edition, 2013

REFERENCES

1. Deitel H M and Deitel P J, "JAVA-How to Program", Prentice Hall of India Private Limited, New Delhi, 2008.
2. D.Jana, Java and Object oriented Programming Paradigm, PHI, New Delhi, 2005.

E REFERENCES

1. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
2. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
3. <http://freevidelectures.com/Course/2513/Java-Programming>.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	3	3	3	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	3	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	2	3
CO 5	3	3	2	2	2	1	2	2	3
Total	15	15	11	11	11	5	10	13	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA406 RESOURCE MANAGEMENT TECHNIQUES

Course Outcomes:

CO1	C	Understanding	<i>Explain</i> the basic concepts of optimization and to formulate and <i>Solve</i> Linear Programming problems.
CO2	C	Understanding Apply	<i>Explain</i> and <i>Apply</i> the concepts of Transportation problem and Assignment problem.
CO3	C	Understanding Apply	<i>Explain</i> and Apply the concepts of sequencing problem
CO4	C	Apply	<i>Explain</i> and <i>Demonstrate</i> the basic concepts of PERT-CPM and their applications in product planning control.
CO5	C	Understanding Apply	<i>Solve</i> the Minimal Spanning Tree Problem, Shortest Route Problem, Maximal Flow Problem and Minimal Cost Capacitated Flow Problem.

COURSE CODE	COURSE NAME	L	T	P	C
XCA406	RESOURCE MANAGEMENT TECHNIQUES	3	2	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Mathematics	3	2	0	5
UNIT- I: LINEAR MODELS					15
Basics of OR & Decision making - Role of computers in OR, Linear Programming Problem – Formulation, Graphical solution of two variables Canonical & standard form of LPP, Simplex method, Charne’s method of penalties.					
UNIT- II: TRANSPORTATION AND ASSIGNMENT PROBLEMS					15
Transportation algorithm - Degeneracy algorithm- Unbalanced Transportation problem- Unbalanced assignment algorithm.					
UNIT – III: SEQUENCING PROBLEM					15
Processing of n jobs through two machines -Processing of n jobs through three machines- Processing of n jobs through m machines.					
UNIT- IV: PERT & CPM					15
Network - Fulkerson’s rule- Measure of activity- PERT computation- CPM computation.					
UNIT –V: NETWORK MODELS					15
Network definition- Minimal spanning tree problem- Shortest route problem- Maximal flow problem- Minimal cost capacitated flow problem.					
		LECTURE	TUTORIAL	TOTAL	
		45	30	75	
TEXT					
1. Hamdy A. Taha, Operations Research An Introduction, Eighth Edition, PearsonEducation, Inc., 2008					

2. Kantiswaroop, Gupta P.K and Manmohan, Operations Research, Sultan Chand & Sons, New Delhi, 2008

REFERENCES

1. Prem Kumar Gupta and D.S. Hira, Operations Research, S. Chand and Co., Ltd. New Delhi, 2008.

2. Gupta R. K., Linear Programming, KrishnaPrakashanMedia(P) Ltd. , 2009.

E REFERENCES

1. Lecture Series on Fundamentals of Operations Research by Prof.G.Srinivasan, Department of Management Studies, IIT Madras. For more details on NPTEL visit <http://nptel.iitm.ac.in>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	1	0	0	1	0	1	0	0
CO 2	3	1	0	0	1	0	1	0	0
CO 3	3	1	0	0	1	0	1	0	0
CO 4	3	1	0	0	1	0	1	0	0
CO 5	3	1	0	0	1	0	1	0	0
Total	15	5	0	0	5	0	5	0	0
Course	3	1	0	0	1	0	1	0	0

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA407 OPERATING SYSTEMS

Course Outcomes:

CO1	C	Understand	<i>Explain</i> the operating system functions				
CO2	C	Understand	<i>Express</i> the process and various process scheduling algorithms				
CO3	C	Understand	<i>Discuss</i> process cooperation and inter process communication				
CO4	C	Understand	<i>Describe</i> various memory management concepts				
CO5	C	Understand	<i>Infer</i> file organization				
COURSE CODE		COURSE NAME		L	T	P	C
XCA407		OPERATING SYSTEMS		3	0	0	3
C:P:A = 3:0:0							
				L	T	P	H
PREREQUISITE		C++		3	0	0	3
UNIT I OVERVIEW OF OPERATING SYSTEMS							9
Functionalities and objectives of operating Systems- processor register- instruction execution- interrupts- types of interrupts.							
UNIT II PROCESS MANAGEMENT							9
Process concepts: process states- process control block- process and threads- processor scheduling- scheduling algorithms.							
UNIT III PRINCIPLES OF CONCURRENCY							9
Critical Sections - Mutual Exclusion - Process Cooperation- Inter Process Communication- Deadlock Prevention- Detection- Avoidance- Semaphores- Monitors-Message Passing.							
UNIT IV MEMORY MANAGEMENT							9
Virtual Memory Concepts- Paging and Segmentation- Address Mapping- Virtual Storage Management- Page Replacement Strategies.							
UNIT V FILE ORGANIZATION							9
Blocking and buffering, file descriptor- file and directory structures- I/O devices- disk scheduling.							
		LECTURE	TUTORIAL	PRACTICALS		TOTAL	
		45	0	0		45	
TEXT							
1. William Stallings, Operating Systems , Prentice Hall of India (P) Ltd, 7 th edition-2012.							
2. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, Sixth edition. Addison-Wesley (2003).							
REFERENCES							

1. Andrew Tanenbaum, "Modern Operating Systems", Pearson, 2008.
2. Silberschatz and P. B. Galvin, "Operating System Concepts", 7th Edition, Addison Wesley Publication.

E REFERENCES

1. <http://www.nptel.ac.in/courses/106108101/>
2. http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html
3. <http://www.nptel.ac.in/downloads/106108101/>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	2	3	2	2	2	1	2	2	2
CO 5	3	2	2	2	2	1	2	2	2
Total	14	13	10	10	10	5	10	13	13
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA408 DATA ANALYTICS LABORATORY

Course Outcomes:

CO1	C	Apply	<i>Solve</i> the data in worksheet <i>Performs</i> data organization in worksheet with variety of samples
CO2	C	Apply	<i>Interpret</i> Formulas in an Excel Spread sheet <i>Selects</i> formulas for calculating the data in a spread sheet
CO3	C	Apply	<i>Apply</i> the data with statistical and Mathematical functions
CO4	C	Apply	<i>Displays</i> the chart for any real time data
CO5	C	Apply	<i>Starts</i> to work with Analysis built in tools <i>Practices</i> built in tools with different samples

COURSE CODE	COURSE NAME	L	T	P	C
XCA408	DATA ANALYTICS-LABORATORY	0	0	1	1
C:P:A =1:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	0	0	2	2
					30

Lab:

1. Create a table to perform statistical and mathematical functions.
2. Create a spreadsheet to sort data and print portions of a worksheet.
3. Import and Export the data from the database and files.
4. Create a spreadsheet to perform “What if?” calculations.
5. Demonstrates the ease of creating charts.
6. Draw a Histogram Diagram in MS-Excel using student data set.
7. Perform Regression analysis with given dataset.
8. Perform correlation analysis with given data.
9. Create pivot table and carry out the analysis with charts.

	LECTURE		TUTORIAL		PRACTICAL		TOTAL		
	0	0	0	0	30	30	30	30	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	2	2
CO 5	3	2	2	2	2	1	2	2	2
Total	15								

		13	10	10	10	5	10	13	13
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA409 JAVA PROGRAMMING LABORATORY

Course Outcomes:

CO1	C	Apply	<i>Solve</i> the class, packages and interfaces
CO2	C	Apply	<i>Interpret</i> the inheritance concepts
CO3	C	Apply	<i>Interpret</i> various types of exception and its handling methods <i>Build</i> a program to implement exception handling concepts
CO4	C	Apply	<i>Apply</i> the Applets methods in Graphics, AWT controls and event handling
CO5	C	Apply	<i>Use</i> an application using event handling method

COURSE CODE	COURSE NAME	L	T	P	C
XCA409	JAVA PROGRAMMING LABORATORY	0	0	1	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	C++ Programming	0	0	2	2
					30

Lab

1. Program to implement simple programs based on operators, Loop and decision making statements.
2. Program to implement array
3. Program to implement a class and instantiate its object.
4. Program to demonstrate the use of interfaces.
5. Program to implement user-defined and pre-defined packages.
6. Program to implement constructor and overloading concepts
7. Program to implement wrapper classes.
8. Program to implement string class and string buffer class.
9. Program to implement single level and multi level inheritance.
10. Program to implement exception handling.
11. Program to implement a simple applet.
12. Program to implement an applet using graphics class.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
0	0	30	30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	3	3	3	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	3	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	2	3
CO 5	3	3	2	2	2	1	2	2	3
Total									

	15	15	11	11	11	5	10	13	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA410 OPERATING SYSTEMS LABORATORY

Course Outcomes:

CO1	C	Apply	Implement the process and various process scheduling algorithms Executes the different types of scheduling algorithms
CO2	C	Apply	Recognize the principles of concurrency Builds a program model for deadlock prevention and avoidance
CO3	C	Apply	Integrates different memory management techniques
CO4	C	Apply	Apply the fixed size and variable size page replacement algorithm
CO4	C	Apply	Implement and understand the file organization

COURSE CODE	COURSE NAME
XCA410	OPERATING SYSTEMS LABORATORY
C:P:A = 1:0:0	
PREREQUISITE	C++

Lab :

1. Simulate the FCFS - CPU Scheduling Algorithms.
2. Simulate the SJF - CPU Scheduling Algorithms.
3. Simulate the Priority - CPU Scheduling Algorithms.
4. Simulate the Round Robin - CPU Scheduling Algorithms.
5. Simulate MVT and MFT
6. Simulate Bankers algorithm for Deadlock Avoidance (As per Industry Expert Recommendation)
7. Simulate Bankers Algorithm for deadlock Prevention (As per Industry Expert Recommendation)
8. Simulate FIFO Page Replacement Algorithms
9. Simulate LRU Page Replacement Algorithms
10. Simulate Optimal Page Replacement Algorithms
11. Simulate Paging Technique of Memory Management

Note: Use Unix or Ubuntu or Open Source

	PO1	PO2	PO3	PO4	PO5
CO 1	3	3	2	2	2
CO 2	3	3	2	2	2
CO 3	3	2	2	2	2
CO 4	2	3	2	2	2
CO 5	3	2	2	2	2
Total	14	13	10	10	10
Course	3	3	2	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA501 XML AND WEB SERVICES

Course Outcomes:

CO1	C	Understand	<i>Explain</i> the concepts of XML
CO2	C	Understand	<i>Demonstrate</i> the XML schema and DT
CO3	C	Understand	<i>Explain</i> the XML presentation and Transformation technique
CO4	C	Understand	<i>Explain</i> the Web Services Building Block
CO5	C	Understand	<i>Discuss</i> the XML concepts to work with Webservices

COURSE CODE	COURSE NAME	L	T	P	C
XCA501	XML AND WEB SERVICES	1	0	0	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	HTML Concepts	1	0	0	1
UNIT-I: FUNDAMENTALS OF XML					5
Role of XML - XML and the Web - XML Language Basics - SOAP - Web Services - Revolutions of XML - Service Oriented Architecture (SOA).					
UNIT –II: XML TECHNOLOGY FAMILY					5
XML - Name Spaces - Structuring With Schemas and DTD - Presentation Techniques - Transformation - XML Infrastructure.					
UNIT – III: WEB SERVICES BUILDING BLOCK					5
Overview Of SOAP - HTTP - XML-RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns and Faults - SOAP with Attachments					
		LECTURE	PRACTICAL	TOTAL	
		15	0	15	
TEXT					
1. Ron Schmelzer, Travis Vandersypen and Jason Bloomberg, “XML and Web Services”, Pearson Education, 2002.					
2. Eric Newcomer and Greg Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005.					
3. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect's Guide”, Prentice Hall, 2004.					
REFERENCES					
1. Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002.					
2. Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education, 2003.					
E REFERENCES					
1. https://www.w3.org/					
2. http://www.w3schools.com/					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	2	3
CO 5	3	2	2	2	2	1	2	2	3
Total	15	13	10	10	10	5	10	13	15
Course	3	2	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1– Low relation

XCA502A SOFTWARE ENGINEERING

Course Outcomes:

CO1	C	Understand	<i>Explain</i> the various types of software process models
CO2	C	Understand	<i>Demonstrate</i> the concept of software planning activities, risk management and estimation
CO3	C	Understand	<i>Describe</i> the various software design models
CO4	C	Understand	<i>Illustrate</i> the test case and various testing methods
CO5	C	Understand	<i>Interpret</i> the software configuration management and quality assurance

COURSE CODE	COURSE NAME			L	T	P	C
XCA502A	SOFTWARE ENGINEERING			4	1	0	5
C:P:A = 5:0:0							
				L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design			4	1	0	5
UNIT- I : SOFTWARE PROCESS MODELS							12
A generic view of process - Process models: The waterfall model – Incremental model – Evolutionary model – Specialized model – The unified process–Agile process – Agile models							
UNIT- II: SOFTWARE PROJECT AND RISK MANAGEMENT							12
Project management - Project planning – Resources – Project estimation - Software project scheduling- Risk management - System engineering — Requirements engineering							
UNIT- III: SOFTWARE DESIGN							12
Design concepts – Design models – Pattern based design – Architectural design – Component level design – User interface : analysis and design							
UNIT- IV: SOFTWARE TESTING							12
Software testing – Strategies – conventional software - Object oriented software – Validation testing – System testing – Debugging - Testing tactics – Testing fundamentals – White box testing – Basis path testing – Control structure testing – Black box testing.							
UNIT –V: SCM AND QUALITY ASSURANCE							12
Software configuration and management – Features – SCM process – Software quality concepts – Quality assurance – Software review– Technical reviews – Formal approach to software quality assurance – Statistical software quality assurance - Reliability – Quality standards – Software quality assurance plan							
				LECTURE	TUTORIAL	PRACTICAL	TOTAL
				60	15	0	75
TEXT							
1. Roger Pressman.S., Software Engineering: A Practitioner's Approach, Sixth Edition, Mcgraw Hill, 2008.							
2. Jalote Pankaj, An Integrated Approach to Software Engineering, Third Edition, Narosa Book Distributors Pvt Ltd, 2005.							
REFERENCES							
1. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli, Fundamentals of Software Engineering, Prentice Hall Of India, 1991.							
2. I. Sommerville, Software Engineering, Eighth Edition, Pearson Education, 2006							

E REFERENCES

1. NPTEL, Software Engineering, Prof. N. L. Sarda Computer Science & Engineering Indian Institute of Technology, Bombay

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	3	2
CO 2	3	3	2	2	2	1	1	3	2
CO 3	3	3	2	2	2	1	1	3	2
CO 4	3	2	2	2	2	1	1	3	2
CO 5	2	2	2	2	2	1	1	3	2
Total	14	13	10	10	10	5	5	15	10
Course	3	3	2	2	2	1	1	3	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA502B INTERNET OF THINGS

Course Outcomes:

CO1	C	Remember	<i>Describe</i> the various types of software process models
CO2	C	Remember	<i>Define</i> the concept of software planning activities, risk management and estimation
CO3	C	Remember	<i>Describe</i> the various software design models
CO4	C	Remember	<i>Recite</i> the test case and various testing methods
CO5	C	Remember	<i>Memorize</i> the software configuration management and quality assurance

COURSE CODE	COURSE NAME	L	T	P	C
XCA502B	INTERNET OF THINGS	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	4	1	0	5
UNIT- I: INTRODUCTION					12
Introduction Of Iot- Advantage And Disadvantage Of Iot- Embedded System Of Iot- Software & Hardware Embedded System – Iot Ecosystem – Iot Decision Framework.					
UNIT- II: ARCHITECTURE & DOMAIN					12
Components of Iot Architecture – Energy Domain –Biometric Domain – Smart agricultureIot Transforming Businesses.					
UNIT- III: IOT DEVICES					12
Smart Object – Iot Device – Major Iot Boards – Raspberry Pi – Arduino					
UNIT- IV: COMMUNICATIONS					12
Data Link Communication Protocol – Bluetooth - Z-Wave - Zigbee Smart Energy - Network Layer Protocols - Rpl Protocol - Corpl Protocol - Carp Protocol - Session Layer Protocols - Mqtt – Smqtt – Coap – Dds.					
UNIT –V: SCM AND QUALITY ASSURANCE					12
Challenges In Iot Implementation - Iot Applications - Iot For Smart Cities - Media,Marketing& Advertising - Iot-Virtualization					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		60	15	0	75
TEXT					
David Hanes, Gonzalo Salgueiro, Patrick Grossetete,Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, 1 st Edition, Pearson Education (Cisco Press Indian Reprint).					
REFERENCES					
1.Vijay Madiseti and ArshdeepBahga, “Internet of Things (A Hands – on – Approach)”, 1 st Edition, VPT, 2014. (ISBN: 978-8173719547)					
2. Raj Kamal, “Internet of Things: Architecture and Design Principles”, 1 st Edition, McGraw Hill Education, 2017. (ISBN:978-9352605224)					
E REFERENCES					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	3	2
CO 2	3	3	2	2	2	1	1	3	2
CO 3	3	3	2	2	2	1	1	3	2
CO 4	3	2	2	2	2	1	1	3	2
CO 5	2	2	2	2	2	1	1	3	2
Total	14	13	10	10	10	5	5	15	10
Course	3	3	2	2	2	1	1	3	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA503A UNIX AND SHELL PROGRAMMING

Course Outcomes:

CO1	C	Understand	<i>Explain</i> UNIX operating system and architectures				
CO2	C	Understand	<i>Explain</i> UNIX File Systems and Commands				
CO3	C	Understand	<i>Describe</i> the operating system processes and its execution				
CO4	C	Understand	<i>Explain</i> the Shell Environment concepts				
CO5	C	Understand	<i>Explain</i> Shell Programming statements				
COURSE CODE		COURSE NAME		L	T	P	C
XCA503A		UNIX AND SHELL PROGRAMMING		4	1	0	5
C:P:A = 5:0:0							
				L	T	P	H
PREREQUISITE		Basic Concepts of Programming, Design		4	1	0	5
UNIT- I: INTRODUCTION TO UNIX						12	
Unix Operating System – The System Administrator - Logging in – Logging out – Hands on Session – POSIX and the Single UNIX Specification – Linux and GNU - The UNIX architecture – Features of UNIX.							
UNIT -II: FILE SYSTEM						12	
File – File name – File System Hierarchy – Unix File System – Absolute Pathnames and commands – Home Directory – Unix Commands: pwd, cd, mkdir,rmdir,ls,cp,mv,cat,more,wc,lp- Converting between DOS and UNIX – Compression Programs.							
UNIT- III: PROCESS						12	
Process basics – The shell and init – Displaying Process Attributes – System processes and init – Process creation mechanism – inherited process attributes – Process states and zombies – signal handling – Running jobs in background.							
UNIT- IV: SHELL						12	
The shell as command processor – Shell offerings – pattern matching – Escaping and quoting – Redirection – Collective Manipulation - Special Files – Pipes – Creating a Tee – Command Substitution – Shell variables – Environment Variables.							
UNIT- V: SHELL PROGRAMMING						12	
Shell Scripts – read – command line arguments – Exit status of a command – Logical operation – The if conditional – Using test and [] to evaluate expressions – The case conditional – Computation and String handling – Looping statements – Manipulating positional parameters with set and shift – Shell Functions.							
		LECTURE	TUTORIAL	PRACTICAL	TOTAL		
		60	15	0	75		
TEXT							
1. Sumitabha Das, “Unix and Shell Programming”, Tata McGraw Hill Publications, Fifth							

Edition,2009, New Delhi.

REFERENCES

1. Sumitabha Das, “Unix – Concepts and Applications”, Third Edition, Tata McGraw Hill Publications, New Delhi.
2. Graham Glass and King Ables, “Unix for Programmers and Users”, Third Edition, Pearson Education India (Low Prices Edition).

E REFERENCES

1. NPTEL, Prof. Sorav Bansal, IIT Delhi, “Operating System”.
2. NPTEL, Prof. P.C.P.Bhatt,IISc Bangalore, “Operating System”.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	2	3	2	2	2	1	2	2	2
CO 5	3	2	2	2	2	1	2	2	2
Total	14	13	10	10	10	5	10	13	13
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA503B WEB SCRIPTING FRAMEWORK

Course Outcomes:

CO1	C	Understand	<i>Explain</i> Java Script concepts used in Web programming
CO2	C	Understand	<i>Demonstrate</i> VB Script concepts
CO3	C	Understand	<i>Explain</i> the concepts of Ruby on Rails
CO4	C	Understand	<i>Explain</i> the concepts of Struts
CO5	C	Understand	<i>Explain</i> the concepts of Hibernate

COURSE CODE	COURSE NAME	L	T	P	C
XCA503B	WEB SCRIPTING FRAMEWORK	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of HTML	4	1	0	5
UNIT- I: JAVA SCRIPT					12
Introduction to Java Script: Adding Java Script to XHTML Documents – Java Script Core Features: Overview – Language Characteristics – Arrays – Objects – Expressions – Operators – Control Statements – Loop – Functions – Input/Output statements in JavaScript – Data types and Variables – Operators, Expressions and Statements – Event Handling.					
UNIT- II: VB SCRIPT					12
Introduction to VB Script – Data Types – Variables and Procedures – Control of Flow – Error Handling and Debugging – Client side Web Scripting – Script Encoding.					
UNIT- III: RUBY ON RAILS					12
Introduction – Up and Running – Version Control with GIT – Deploying – A Demo App: Planning the Application – Static Pages: First Tests – Dynamic pages – Rails –Flavored Ruby: Strings and Methods – Ruby Classes.					
UNIT- IV: STRUTS					12
Framework – MVC Architecture – Overview – Environment Set up – Struts Architecture - Struts Actions - Interceptors – UI component tag reference.					
UNIT -V : HIBERNATE					12
Hibernate Overview – Hibernate Architecture – Hibernate Environment setup – Hibernate Examples: Create POJO classes – Create Database Tables – Create Mapping configuration File – Application File – Compilation and Execution.					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		60	15	0	75

TEXT

1. Thomas Powell and Fritz Schneider, “Java Script 2.0 - The complete Reference”, Second Edition, Tata McGraw Hill Publications, 2004.
2. Michael Hartl, “Ruby on Rails Tutorial”, Second Edition, Addison Wesley Professional Ruby Series, 2015.
3. Donald Brown, Chad Michael Davis and Scott Stanlick, “Struts 2 in Action”, Manning Publications Co., 2008.

REFERENCES

1. Dave Minter and Jeff Linwood, “Beginning Hibernate From Novice to Profession”, Apress Publications, 2006.
2. Adrian Kingsley-Hughes, Kathie Kingsley-Hughes, Daniel Read, “VBScript Programmer’s Reference”, Third Edition, Wiley Publications, 2007.

E REFERENCES

1. www.tutorialspoint.com – Hibernate Java Persistence Framework tutorials point.
2. www.tutorialspoint.com – Struts – 2.X tutorials point.
3. <http://www.scribd.com/doc/25244173/Java-Struts-Hibernate-Tutorial> - Java & Struts2 & Spring & Hibernate & Eclipse Tutorial Building a web app from scratch.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	3	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	2	3
CO 5	3	2	2	2	2	1	2	2	3
Total	15	14	10	10	10	5	10	13	15
Course	3	3	1	0	2	1	1	2	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA504A ENTERPRISE RESOURCE PLANNING

Course Outcomes:

CO1	C	Understand	<i>Explain</i> the functionalities of Enterprise resource planning
CO2	C	Understand	<i>Define</i> the ERP implementation procedures
CO3	C	Understand	<i>Describes</i> the elements of ERP
CO4	C	Understand	<i>Differentiate</i> the available ERP packages
CO5	C	Understand	<i>Summarize</i> the models of ERP with other related technologies

COURSE CODE	COURSE NAME	L	T	P	C
XCA504A	ENTERPRISE RESOURCE PLANNING	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	DBMS, Programming	4	1	0	5
UNIT - I: INTRODUCTION					12
ERP: An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM					
UNIT- II: ERP IMPLEMENTATION					12
ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contract with Vendors.					
UNIT- III: THE BUSINESS MODULES					12
Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution					
UNIT- IV: ERP PACKAGES					12
ERP Market Place, SAP AG, PeopleSoft, Baan, JD Edwards, Oracle, QAD, SSA					
UNIT- V: ERP –PRESENT AND FUTURE					12
Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		60	15	0	75
TEXT					
1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000					
REFERENCES					
1. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, ThompsonCourseTechnology, USA, 2001.					
2. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI, New Delhi, 2003					
E REFERENCES					
1. ERP, Prof. P. K. Biswas, Dept. of Electronics and Electrical Communication Engg., IIT, Kharagpur					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	2	2
CO 2	3	3	2	2	2	1	1	2	2
CO 3	3	3	2	2	2	1	1	2	2
CO 4	3	2	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	1	1	2	2
Total	14	13	10	10	10	5	5	10	10
Course	3	3	2	2	2	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA504B ORGANIZATIONAL BEHAVIOR

Course Outcomes:

CO1	C	Understand	<i>Explain</i> the organizational behavior and human relations.
CO2	C	Understand	<i>Illustrate</i> the individual behaviors, perceptions and emotion
CO3	C	Understand	<i>Infer</i> the job characteristics and motivation theory.
CO4	C	Understand	<i>Demonstrate</i> the decision making and creativity.
CO5	C	Understand	<i>Interrelate</i> group behavior and teamwork.

COURSE CODE	COURSE NAME	L	T	P	C
XCA504B	ORGANIZATIONAL BEHAVIOR	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	4	1	0	5
UNIT- I : INTRODUCTION TO ORGANIZATIONAL BEHAVIOUR					12
Introduction to Organizational Behavior -Understanding People at Work -The Evolution of the Field of Organizational Behavior-The Human Relations Movement-The Total Quality Management Movement-The Information Technology Revolution and E-Business-Workforce Diversity-Globalization.					
UNIT- II: INDIVIDUAL BEHAVIOR					12
Perception, Personality, and Emotion-Social Perception stages-Managerial Implications-Self-Perception-Self-Esteem-Self-Efficacy-Self-Monitoring-Causal Attributions -Attributional Tendencies-Personality Dynamics-The Big Five Personality Dimensions-Locus of Control: Self or Environment-Attitudes-Emotions in the Workplace-Positive and Negative Emotions-Research Insights-Emotional Intelligence.					
UNIT- III: MOTIVATION					12
The Fundamentals of Employee Motivation-Need Theories of Motivation-Motivating Employees through Job Design-The Job Characteristics Model-Job Enlargement-Job Rotation-Job Enrichment-Process-Theories of Motivation-Equity Theory of Motivation-Expectancy Theory of Motivation-Motivation through Goal Setting-Putting Motivational Theories to Work.					
UNIT- IV: DECISION MAKING, CREATIVITY, AND ETHICS					12
Models of Decision Making-The Rational Model-Bounded Rationality Model-Dynamics of Decision Making-Personal Decision-Making Styles-Escalation of Commitment-Creativity-Group Decision Making-Advantages and Disadvantages of Group Decision Making-Participative Management-Group Problem-Solving Techniques-Fostering Ethical Decision Making-A Model of Ethical Behavior-Three Criteria for Ethical Decision Making -How to Improve the Organization's Ethical Climate.					
UNIT- V: GROUPS AND TEAMWORK					12
Fundamentals of Group Behavior-Formal and Informal Groups-The Group Development Process-Group Member Roles-Norms-Teams Trust, and Teamwork-A Team Is More Than Just a Group-Trust: A Key Ingredient of Teamwork -Self-Managed Teams-Virtual Teams-					

Why Do Work Teams Fail-Problems with Self-Managed Teams-Team Building.			
	LECTURE	TUTORIAL	TOTAL
	60	15	75
TEXT			
1. Robert Kreitner, Angelo Kinicki, Nina Cole, “Fundamentals of Organizational Behaviour Key Concepts, Skills, and Best Practices”, Second Edition, McGraw Hill, 2002.			
REFERENCES			
1. Slocum and Hell Riegel, “Fundamentals Organisational Behaviour”, Cengage learning, 2007.			
2. Steven L Mcshane, Mary Ann Von Glinow and Radha R. Sharma, “Organizational Behaviour”, Tata Mcgraw Hill, 2014.			
3. Paul Hersey Kenneth. H. Blanchard and Dewey , “Management of Organizational Behavior: Leading Human Resources”, PHI Learning, 2008.			
E-REFERENCES			
1. http://nptel.iitm.ac.in			
2. http://www.nptel.ac.in/courses/110105034/			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	2	2
CO 2	3	3	2	2	2	1	1	2	2
CO 3	3	3	2	2	2	1	1	2	2
CO 4	3	2	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	1	1	2	2
Total	14	13	10	10	10	5	5	10	10
Course	3	3	2	2	2	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA505 XML AND WEB SERVICES LABAROTARY

Course Outcomes:

CO1	C	Apply	<i>Use</i> to work with XML tags
CO2	C	Apply	<i>Illustrate</i> the middleware with XML schema and DTD
CO3	C	Apply	<i>Infer</i> all the CSS tags to represent the XML data
CO4	C	Apply	<i>Organizes</i> the web services with XML tags
CO5	C	Apply	<i>Uses</i> the XML concepts to perform the Web services

COURSE CODE	COURSE NAME	L	T	P	C
XCA505	XML AND WEB SERVICES LABAROTARY	0	0	1	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	HTML Concepts	0	0	2	2
30					
<ol style="list-style-type: none"> 1. Create a XML document to store an address book. 2. Create a XML document to store information about books and create the Internal DTD files. 3. Create a XML document to store resumes for a job web site and create the External DTD file. 4. Create a XML schema for the book's XML document. 5. Present the book's XML document using cascading style sheets (CSS). 6. Write a XSLT program to extract book titles, authors, publications, book rating from the book's XML document and use formatting. 7. Use Microsoft DOM to navigate and extract information from the book's XML document. 8. Create a web service for temperature conversion with appropriate client program. 					
		LECTURE	PRACTICAL	TOTAL	
		0	30	30	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	2	3
CO 5	3	2	2	2	2	1	2	2	3
Total	15	13	10	10	10	5	10	13	15

Course	3	2	2	2	2	1	1	3	3
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0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA506A UNIX AND SHELL PROGRAMMING LABAROTARY

Course Outcomes:

CO1	C	Apply	<i>Use</i> an operating system environment to work with various applications.
CO2	C	Apply	<i>Selects</i> commands to perform the execution
CO3	C	Apply	<i>Manipulate</i> the UNIX processes
CO4	C	Apply	<i>Displays</i> the Shell environment and processing technique
CO5	C	Apply	<i>Represent</i> to work with Shell Programming

COURSE CODE	COURSE NAME	L	T	P	C
XCA506A	UNIX AND SHELL PROGRAMMING LABAROTARY	0	0	1	1
C:P:A =1:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	0	0	2	2
				30	

Lab:

1. Execution of various file/directory handling commands.
2. Shell scripts to check various attributes of files and directories.
3. Shell scripts to explore system variables such as PATH, HOME etc.
4. Use seed instruction to process /etc/password file.
5. Shell scripts to check and list attributes of processes.
6. Write awk script that uses all of its features.
7. Write a shell script to display list of users currently logged in.
8. Write a shell script to delete all the temporary files.
9. Write a shell script to ask your name, program name and enrolment number and print it on the screen.
10. Write a shell program to exchange the values of two variables.
11. Write a shell program to find the Fibonacci series.
12. Write a shell program to concatenate two strings and find the length of the resultant string.
13. Write a shell program to find factorial of given number.
14. Write a shell program to find the sum of all the digits in a given number.
15. Write a shell program to find the sum of the series $sum=1+1/2+\dots+1/n$.
16. Write a shell program to check whether a given string is palindrome or not.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	0	0	30	30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	2	3	2	2	2	1	2	2	2
CO 5	3	2	2	2	2	1	2	2	2
Total	14	13	10	10	10	5	10	13	13

Course	3	3	2	2	2	1	1	3	3
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0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA506B WEB SCRIPTING FRAMEWORK LABAROTARY

Course Outcomes:

CO1	C	Apply	<i>Apply</i> web programs with java script statements
CO2	C	Apply	<i>Use</i> the VB Script concepts to create the programs
CO3	C	Apply	<i>Organizes</i> the concepts to create the web pages
CO4	C	Apply	<i>Examine</i> a program with Struts
CO5	C	Apply	<i>Interpolate</i> to work with Hibernate

COURSE CODE	COURSE NAME
XCA506B	WEB SCRIPTING FRAMEWORK LABAROTARY
C:P:A = 1:0:0	
PREREQUISITE	Basic Concepts of HTML

Lab:

1. Write a java script program with arrays.
2. Write a java script program using control structure.
3. Write a java script program using Functions.
4. Write a java script program with dialog boxes
5. Write a program to perform the events with java script
6. Write a program to perform the control structure in VB script.
7. Write a program to display the day in a week using VB script.
8. Write a program to calculate the simple interest using VB script events.
9. Write a program to validate the user using VB script with HTML form element
10. Writing a web application using ruby on rails.
11. Create a program using struts.
12. Build a simple application with Hibernate

	PO1	PO2	PO3	
CO 1	3	3		2
CO 2	3	3		2
CO 3	3	3		2
CO 4	3	3		2
CO 5	3	2		2
Total	15	14		10
Course	3	3		1

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA601 INTRODUCTION TO PYTHON

Course Outcomes:

CO1	C	Knowledge	Explain the functionalities of Python interpreter
CO2	C	Understand	Define the Data types and control structure
CO3	C	Understand	Describes Classes and modules
CO4	C	Understand	Define the use of Exception handling
CO5	C	Understand	Summarize the file organization and uses

COURSE CODE	COURSE NAME	L	T	P	C
XCA601	INTRODUCTION TO PYTHON	1	0	0	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	1	0	0	1
UNIT- I: INTRODUCTION TO PYTHON					5
Introduction - Using the Python interpreter -Introduction to binary computation - Input / Output operations- Data types and control structures -Operators (unary, arithmetic, etc.) -Data types, variables, expressions, and statements - Assignment statements - Strings and string operations -Control Structures: loops and decision					
UNIT- II: CLASSES AND MODULES					5
Modularization and Classes - Standard modules - Packages - Defining Classes - Defining functions -Functions and arguments (signature)					
UNIT- III: EXCEPTION HANDLING					5
Exceptions and data structures -- Data Structures (array, List, Dictionary) -- Error processing -- Exception Raising and Handling- Principles of Object Orientation - Creating Classes - Instance Methods - File Organization					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		15	0	0	15
TEXT					
1.Mark Summerfield, Programming in Python-A Complete Introduction to Python Language, Second Edition, Addison Wesley, 2010.					
REFERENCES					
1.David M. Beazley, "Python Essential Reference" Third Edition, Sams Publishing 2006. 2.Alex Martelli, Anna Martelli Ravenscroft, and David Ascher, "Python Cookbook", Third Edition, O'Reilly, 2002.					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	3	3
CO 5	3	2	2	2	2	1	2	3	3
Total	15	13	10	10	10	5	10	15	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA602A .NET TECHNOLOGIES

Course Outcomes:

CO1	C	Knowledge	<i>Knowledge</i> on .Net Technologies basic controls and events
CO2	C	Understand	<i>Knowledge</i> on Object Oriented Programming with C#
CO3	C	Understand	<i>Understand</i> and <i>implement</i> VB.Net
CO4	C	Understand	<i>Apply</i> and <i>Implement</i> C#.Net and VB.Net using various tools
CO5	C	Understand,	<i>Understand</i> Framework and threads

COURSE CODE	COURSE NAME	L	T	P	C
XCA602A	.NET TECHNOLOGIES	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	4	1	0	5
UNIT- I: INTRODUCTION TO .NET TECHNOLOGIES					12
Introduction to Web Technologies - HTML Basics – Scripts - Sample Programs – Advantages and Disadvantages of Client-side and Server-side Scripts –Overview of Client-side Technologies and Server-side Technologies. History of .NET - .NET Framework Components.					
UNIT- II: INTRODUCTION TO C#					12
Introduction to C# - Overview of C#, Literals, Variables, DataTypes, Operators, Expressions, Control Structures-Methods, Arrays, Strings, Structures, Enumerations – OOPS:Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading - Delegates, Events, Errors and Exceptions.					
UNIT- III: INTRODUCTION TO VB.NET					12
Introduction VB.NET -IDE – Creating a shortcut to start VB.NET - Manoeuvrings the Toolbar – Auto-hide, Docking and Undocking, Placing and Resizing the Windows – Forms – Properties Window and Solution Explorer - Writing and Event Procedure – Execution - Basic Keywords – Data Types – VB.NET statements – Conditional statements - If Else – Select Case – Switch and Choose – Loops – Do – For Next – For Each Next – While – Arrays.					
UNIT- IV: APPLICATION DEVELOPMENT ON .NET					12
C#.NET : Building Windows Applications, VB.NET : Windows Forms – Working with Controls – Timer, Picture-box, Group-box, Combo-box, Horizontal and Vertical Scrollbar, Numeric-up-down, Track-bar, and Progress-bar – Subroutines and Functions in VB.NET – Database application					
UNIT- V: ADO .NET CONNECTIVITY					12
Introduction to ADO.NET – ADO vs ADO.NET – Architecture – Data reader – data adopter - Accessing Data with ADO.NET, Programming Web Applications with Web Forms. ASP NET applications with ADO.NE					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		60	15	0	75
TEXT					

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004.
2. ShirishChavan, "Visual Basic.NET", Edition 2009, Pearson Education. Matt J. Crouch, "ASP.NET and VB.NET Web Programming", Edition 2012.

REFERENCES

1. Art Gittleman, "Computing with C# and the .NET Framework", Jones & Bartlett Learning, 2011

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	3	3
CO 5	3	2	2	2	2	1	2	3	3
Total	15	13	10	10	10	5	10	15	15
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA602B PROGRAMMING WITH PHP AND MYSQL

Course Outcomes:

CO1	C	Understand	<i>Explain</i> the basic function of PHP and uses of open sources technologies.
CO2	C	Understand	<i>Explain</i> the array and functions in PHP.
CO3	C	Understand	<i>Describe</i> the various DB architectures, constraints and normalization forms.
CO4	C	Understand	<i>Explain</i> the statements in MySQL and its effectiveness.
CO5	C	Understand	<i>Describe</i> to implement PHP and MySQL.

COURSE CODE	COURSE NAME	L	T	P	C
XCA602B	PROGRAMMING WITH PHP AND MYSQL	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming and DBMS	4	1	0	5
UNIT- I: INTRODUCTION TO OPEN SOURCE AND PHP					12
Introduction- open source-PHP – history- features-variables- statements operators- conditional statements-if-switch-nesting conditions-merging forms with conditional statements-loops-while-do-for – loop iteration with break and continue.					
UNIT- II: ARRAY AND FUNCTIONS					12
Arrays: Creating an array- modifying array-processing array-grouping form with arrays- using array functions- creating user defined functions- using files- sessions- cookies- executing external programs- Creating sample applications using PHP.					
UNIT- III: DATABASE MANAGEMENT SYSTEM					12
Components of Database system-Definition and benefits of database-Data Independence-Three level of database architecture-Database Management system- Client server architecture-Distributed processing-Domains-Relations-Integrity constraints-Candidate keys-Primary keys-Foreign keys-Functional dependency(Basic definition)-Normal Forms (1NF, 2NF, 3NF, BCNF)-ER model – OOAD model.					
UNIT- IV: MySQL					12
Effectiveness of MySQL -MySQL Tools-Prerequisites for MySQL connection- Databases and tables- MySQL data types-Creating and manipulating tables- Insertion, updation and deletion of rows in tables -Retrieving data- Sorting and filtering retrieved data -Advanced data filtering-Data manipulation functions- Aggregate functions -Grouping data- Sub queries- Joining Tables- Set operators- Full text search					
UNIT- V: PHP with MySQL					12
Working MySQL with PHP-database connectivity- usage of MYSQL commands in PHP, processing result sets of queries- handling errors-debugging and diagnostic functions- validating user input through Database layer and Application layer- formatting query output with Character, Numeric, Date and time –sample database applications					
	LECTURE	TUTORIAL	PRACTICAL	TOTAL	
	60	15	0	75	
TEXT					

1. VikramVaswani, PHP and MySQL, Tata McGraw-Hill, 2005
2. Ben Forta , MySQL Crash course SAMS, 2006.
3. C.J. Date, An Introduction to Database Systems, Addison Wesley, Sixth Edition.
4. Ramesh Elmasri and Shamkant B Navathe, Fundamentals of DataBase Systems, Pearson Education,Third Edition.

REFERENCES

1. Tim Converse, Joyce Park and Clark Morgan, PHP 5 and MySQL, Wiley India reprint, 2008.
2. Robert Sheldon, Geoff Moes, Beginning MySQL, Wrox, 2005

E REFERENCES

1. NPTEL, Database management systems,Dr. Arnab Bhattacharya,IIT Kanpur

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	2	3	2	2	2	1	2	2	2
CO 5	3	2	2	2	2	1	2	2	2
Total	14	13	10	10	10	5	10	13	13
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1– Low relation

Course Outcomes:

CO1	C	Understand	<i>Describes</i> the medium access control layers
CO2	C	Understand	<i>Characterize</i> the wireless transmission technologies
CO3	C	Knowledge	<i>Describe</i> the mobile network layer and IP packet delivery
CO4	C	Understand	<i>Comprehend</i> TCP and the transmission mobile transport layer
	A	Originate	<i>Characterizing</i> mobile transport layer
CO5	C	Understand	<i>Summarize</i> the WAP and its applications

COURSE CODE	COURSE NAME	L	T	P	C
XCA603A	MOBILE COMPUTING	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	4	1	0	5
UNIT-I: MEDIUM ACCESS CONTROL					12
Multiplexing- Hidden and exposed terminals-Near and far terminals. SDMA – FDMA – TDMA – CDMA- Comparison of Access Mechanisms – Telecommunication: GSM. Satellite Systems: Basics- Routing- Localization- Handover.					
UNIT- II: WIRELESS NETWORKS					12
Wireless LAN: Advantages and Disadvantages-Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks – Bluetooth- Wireless ATM: Working Group-Services- Reference Model – Functions – Radio Access Layer – Handover- Handover reference model- Requirements and Types.					
UNIT- III: MOBILE NETWORK LAYER					12
Mobile IP : Goals – Assumptions and Requirement – Entities – IP packet Delivery- Agent Advertisement and Discovery – Registration – Tunneling and Encapsulation – Optimization – Reverse Tunneling – IPv6.					
UNIT- IV: MOBILE TRANSPORT LAYER					12
Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP- Fast retransmit/ Fast Recovery- Transmission/ Timeout Freezing – Selective Retransmission.					
UNIT- V:WAP					12
Architecture – Datagram Protocol- Transport Layer Security- Transaction Protocol- Session Protocol- Application Environment-Wireless Telephony Application.					
	LECTURE	TUTORIAL	PRACTICAL	TOTAL	
	60	15	0	75	
TEXT					
1. Jochen Schiller, Mobile Communications, Addison-Wesley, second edition, 2004. 2. Stojmenovic and Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley, 2002, ISBN 0471419028.					
REFERENCES					
1. Reza Behravanfar, Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, ISBN: 0521817331, Cambridge University Press, October 2004 2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, Fundamentals of Mobile and Pervasive Computing, ISBN: 0071412379, McGraw-Hill Professional, 2005.					

E REFERENCES

1. <http://nptel.ac.in/video.php?subjectId=117102062>

	PO1	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	2	2	3
CO 2	3	3	2	2	2	1	1	2	2	3
CO 3	3	3	2	2	2	1	1	2	2	3
CO 4	3	2	2	2	2	1	1	2	2	3
CO 5	2	2	2	2	2	1	1	2	2	2
Total	14	13	10	10	10	5	5	10	10	14
Course	3	3	2	2	2	1	1	2	2	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA603B DATA SCIENCE

Course Outcomes:

CO1.	C	Remember	Explain the Concept of Data Science
CO2.	C	Remember	Outline the concept of Foundation methods
CO3.	C	Remember	Describe the Data Wrangling concept.
CO4.	C	Remember	Demonstrate Online Analytical Processing concept.
CO5.	C	Remember	Describe Data Warehousing.

COURSE CODE	COURSE NAME	L	T	P	C
XCA603B	DATA SCIENCE	4	1	0	5
C:P:A 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	4	1	0	5
UNIT- I : BASICS OF DATA SCIENCE					15
Evolution of Data Science – Types of Data – Properties of Data – Structured Data - Unstructured Data – Quantitative Data – Categorical Data – Big Data – Little Data – Data Visualization					
UNIT- II: MATHEMATICAL FOUNDATIONS FOR DATA SCIENCE					15
Mean, Median and Mode – Standard Deviation and Variance – Probability – Probability Density Function – Types of Data Distribution – Percentiles and Moments – Correlation and Covariance – Conditional Probability – Regression – Hypothesis					
UNIT- III: DATA PREPARATION AND REPRESENTATION					15
Data Preparation – Data Estimation – Data Wrangling - Importance of Data Wrangling – Tasks of Data Wrangling – Data Wrangling Tools – Data Representation					
UNIT –IV: ONLINE ANALYTICAL PROCESSING (OLAP)					15
Online Analytical Processing (OLAP) – Need for OLAP – Multidimensional Data Model – OLAP Guidelines – Multidimensional vs Multirelational – OLAP tools.					
UNIT- V: DATA WAREHOUSING AND DATA MINING					15
Data Warehousing – Need for data Warehousing – Characteristics of Data Warehousing – Architecture – Components of Data Warehousing; Mining Primitives – Association Rules – Classification and Prediction – Clustering – Essential Data Science Packages					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		60	15	0	75

TEXT BOOKS

1. Laura Igual, SantiSeguí, Introduction to Data Science: A Python Approach to Concepts, Techniques and Applications, 1st ed. 2017 Edition, Springer.
2. Steven S. Skiena, The Data Science Design Manual, 1st ed. 2017, Springer.
3. Jacqueline Kazil& Katharine Jarmul, Data Wrangling with Python, 2016, O’Reilly Media.
4. Alex Berson, Stephon and J. Smith, Data warehousing, Data Mining and OLAP, 2003, Tata McGraw Hill.
5. Jiawei han et, al., Data Mining: Concepts and Techniques , Morgan Kaufmaan Series , 2000.

REFERENCES

1. Margaret H. Dunham, Data Mining – Introductory and Advanced Topics, 2003, Pearson Education, Prentice Hall.
2. SinanOzdemir, Principles of Data Science, 2016, Packt Publishing Limited.

E-REFERENCES

1.NPTEL Course : Data Science for Engineers, By Prof. RagnathanRengasamy, Prof. Shankar Narasimhan | IIT Madras

2.NPTEL Course : Data analytics with Python, By Prof. A. Ramesh | IIT – Roorkeela

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	2	2
CO 2	3	3	2	2	2	1	1	2	2
CO 3	3	3	2	2	2	1	1	2	2
CO 4	3	3	2	2	2	1	1	2	2
CO 5	3	2	2	2	2	1	1	2	2
Total	15	14	10	10	10	5	5	10	10
Course	3	3	2	2	2	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1– Low relation

XCA603C BLOCK CHAIN

Course Outcomes:

CO1	C	Knowledge	<i>Describe</i> distributed database
CO2	C	Understand	<i>Understand</i> block chain network
CO3	C	Understand	<i>Understand crypto</i> currency and bitcoin
CO4	C	Understand	<i>Understand</i> crypto currency regulation
CO5	C	Apply	<i>Apply</i> block chain applications

COURSE CODE	COURSE NAME	L	T	P	C
XCA603C	BLOCK CHAIN	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	4	1	0	5
UNIT-I: INTRODUCTION TO BLOCK CHAIN					12
Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.					
					12
UNIT-II: DISTRIBUTED CONENSUS					
Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.					
UNIT – III: CRYPTOCURRENCY					12
Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin					
UNIT- IV: CRYPTOCURRENCYREGULATION					12
Cryptocurrency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects - Cryptocurrency Exchange, Black Market and Global Economy.					
UNIT-V: BLOCK CHAIN APPLICATIONS					12
Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		60	15	0	75
TEXT					
1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).					
2. Blockchain for Beginners: The Complete Step by Step Guide to Understanding Blockchain Technology by Mark Watney					
Reference					
1. Cryptocurrencies and Blockchains by Quinn DuPont					
2. Blockchain Applications: A Hands-On Approach Paperback by ArshdeepBahga					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	2	2
CO 2	3	3	2	2	2	1	1	2	2
CO 3	3	3	2	2	2	1	1	2	2
CO 4	3	2	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	1	1	2	2
Total	14	13	10	10	10	5	5	10	10
Course	3	3	2	2	2	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA604 INTRODUCTION TO PYTHON LABORATORY

Course Outcomes:

CO1	C	Apply	<i>Apply</i> to work with Python concepts
CO2	C	Apply	<i>Use the</i> basic programs along with trim method
CO3	C	Apply	<i>Interpret</i> program with function
CO4	C	Apply	<i>Interpret</i> program with objects
CO5	C	Apply	<i>Organizes</i> the function with parameter passing

COURSE CODE	COURSE NAME	L	T	P	C
XCA604	INTRODUCTION TO PYTHON LABORATORY	0	0	1	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	PYTHON Concepts	0	0	2	2
					30

Lab:

1. Write python program to print Hello World
2. Write python program to Hello World using string variable
3. Write python program to store data in list and then try to print them.
4. Write python program to do basic trim and slice on string.
5. Write python program to print list of numbers using range and for loop
6. Write python program to store strings in list and then print them.
7. Write python program to let user enter some data in string and then verify data and print welcome to user.
8. Write python program in which an function is defined and calling that function prints Hello World
9. Write python program in which an function(with single string parameter) is defined and calling that function prints the string parameters given to function.
10. Write python program in which an class is define, then create object of that class and call simple print function define in class.

						LECTURE	TUTORIAL	PRACTICAL	TOTAL
						0	0	30	30
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	3	3	2	2	2	1	2	2	3
CO 5	3	2	2	2	2	1	2	2	3
Total	15	13	10	10	10	5	10	13	15
Course	3	2	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA605A .NET TECHNOLOGIELABORATORY

Course Outcomes:

CO1	C	Apply	<i>Apply</i> C#.Net console applications
CO2	C	Apply	<i>Interpret</i> C# control statements
CO3	C	Apply	<i>Apply</i> C#.Net windows control
CO4	C	Apply	<i>Apply</i> C#.Net and VB.Net using various tools
CO5	C	Apply	<i>Explain</i> Framework and threads

COURSE CODE	COURSE NAME	L	T	P	C
XCA605A	.NET TECHNOLOGIES LABORATORY	0	0	1	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	0	0	2	2
					30

Lab:

1. Develop a C# .NET console application to demonstrate the conditional statements.
2. Develop a C# .NET console application to demonstrate the control statements.
3. Develop an application in C#.NET that demonstrates the windows controls
4. Demonstrate Multithreaded Programming in C#.NET
5. Demonstrate subroutines and functions in C#.NET
6. Develop an application for deploying various built-in functions in VB.NET
7. Develop an MDI application for Employee Pay-roll transactions in VB.NET
8. Construct a console application to demonstrate the OOP Concepts
9. Develop a web application in VB.NET for dynamic Login Processing
10. Develop a Windows application with database connectivity for core-banking transactions

	LECTURE					TUTORIAL		PRACTICAL		TOTAL
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	
						0	0	30		30
CO 1	3	3	2	2	2	1	2	3		3
CO 2	3	3	2	2	2	1	2	3		3
CO 3	3	2	2	2	2	1	2	3		3
CO 4	3	3	2	2	2	1	2	3		3
CO 5	3	2	2	2	2	1	2	3		3
Total	15	13	10	10	10	5	10	15		15
Course	3	3	2	2	2	1	1	3		3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA605B PROGRAMMING WITH PHP AND MYSQL LABORATORY

Course Outcomes:

CO1	C	Apply	<i>Apply</i> a program in PHP to implement the looping and conditional
CO2	C	Apply	<i>Selects</i> the real word problems and applied techniques in cookies and session.
CO3	C	Apply	<i>Selects</i> the real word problems and applied techniques in file management
CO4	C	Apply	<i>Identifies</i> differences between the SQL and MySQL features and functions.
CO5	C	Apply	<i>Build</i> a application to implement PHP and MySQL.

COURSE CODE	COURSE NAME	L	T	P	C
XCA605B	PROGRAMMING WITH PHP AND MYSQL LABORATORY	0	0	1	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming and DBMS	0	0	2	2
					30
Lab:					
1. Creating simple webpage using PHP					
2. Use of conditional statements and looping statements in PHP					
3. Creating different types of arrays					
4. Creating user defined functions					
5. File manipulation using PHP					
6. Creation of sessions					
7. Creation of cookies					
8. Creating simple applications using PHP					
9. Creating simple table with constraints					
10. Insertion, Updation and Deletion of rows in MYSQL tables					
11. Demonstration of joining tables					
12. Usage of subqueries					
13. Usage of aggregate functions and set operators					
14. Working with string, numeric and date functions					
15. Database connectivity in PHP with MySQL					
	LECTURE	TUTORIAL	PRACTICALS	TOTAL	
	0	0	30	30	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
--	-----	-----	-----	-----	-----	-----	-----	-------	-------

CO 1	3	3	2	2	2	1	2	3	3
CO 2	3	3	2	2	2	1	2	3	3
CO 3	3	2	2	2	2	1	2	3	3
CO 4	2	3	2	2	2	1	2	2	2
CO 5	3	2	2	2	2	1	2	2	2
Total	14	13	10	10	10	5	10	13	13
Course	3	3	2	2	2	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

XCA606 PROJECT WORK

COURSECODE	COURSE NAME	L	T	P	C
XCA606	Project Work	0	0	6	6
C:P:A = 0:6:0					
		L	T	P	H
		0	0	10	10

CO1 P Guided Response Practice the Requirements Analysis

CO2 P Guided Response Create the Design for their project

CO3 P Guided Response Create the Coding

CO4 P Guided Response Plan for Testing

CO5 P Guided Response Solve the Conclusion

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	3	3	2	2	2	2	2	3	3
CO 2	3	3	2	2	2	2	2	3	3
CO 3	3	3	2	2	2	2	2	3	3
CO 4	3	3	2	2	2	2	2	3	3
CO 5	3	3	2	2	2	2	2	3	3
Total	15	15	10	10	10	10	10	15	15
Course	3	3	2	2	2	2	2	3	3

XCAOE1 C AND C++ PROGRAMMING LANGUAGE

Course Outcomes:

CO1	C	Knowledge	Knowledge on C programming fundamentals
CO2	C	Understand, Apply	Understand and Apply structure and union
CO3	C	Understand	Understand on advanced concept of pointers and files
CO4	C	Understand	Knowledge on object oriented technologies
CO5	C	Understand, Apply	Apply and Implement levels of Inheritance

SUBCODE	SUB NAME	L	T	P	C
XCAOE1	C AND C++ PROGRAMMING LANGUAGE	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3
UNIT I INTRODUCTION TO C LANGUAGE					9
Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input/Output Operations – Formatted I/O – Decision Making - Branching – if, nested if , switch, goto and Looping- while, do, for statements.					
UNIT II ARRAYS, FUNCTIONS, STRUCTURES AND UNIONS					9
Arrays – dynamic and multi-dimensional arrays - Character arrays and Strings – String handling Functions - User defined Functions – Categories of Functions – Recursion - Structures and Unions – Array of Structures – Structures and Functions					
UNIT III POINTERS AND FILE MANAGEMENT					9
Pointers – Declaration, Accessing a variable, character strings, pointers to functions and structures - File Management in C – Dynamic Memory allocation – Linked Lists – Preprocessors.					
UNIT IV INTRODUCTION TO C++					9
Overview of C++-Classes and Objects-Friend Functions-Friend Classes-Inline Function-Static Members-Arrays-Pointers-References-Dynamic Allocation- Function Overloading-Overloading Constructor Functions-Copy Constructors-Default Argument-Operator Overloading-Member Operator Overloading					
UNIT V ADDITIONAL FEATURES					9
Inheritance-Base Class-Access Control-Virtual Functions-Pure Virtual Functions-Templates-Generic Functions-Applying Generic Functions-Generic Classes-Exception Handling-C++ I/O Streams-File I/O-STL-Overview-Container Classes-Lists-Maps-Algorithms Using Functions and Objects-String Class					
		LECTURE	PRACTICAL	TUTORIAL	TOTAL
		45	0	0	45

TEXT

1. E.Balagurusamy, Programming in ANSI C , Tata McGraw Hill, 2008
2. Herbert Schildt, C++ The Complete Reference, Tata McGrawHill Edition, 2014

REFERENCES

1. Deitel and Deitel, C How to Program, Addison Wesley , 2011
2. K. N. King,C Programming: A Modern Approach, 2nd Edition, W. W. Norton & Company; 2 edition,2008
3. Robert Lafore, OOP in Turbo C++,Galgotia Publications, 2001

XCAOE2 DIGITAL IMAGING AND EDITING TECHNIQUES

Course Outcomes:

CO1	C	Understanding	<i>Explain</i> the various attributes of Photoshop basics.
CO2	C	Understanding	<i>Identify</i> the concept of working with layers
CO3	C	Knowledge	<i>Describe</i> the various forms of Painting tools
CO4	C	Understanding	<i>Recognize</i> the advanced tools for making colors
CO5	C	Understanding	<i>Describe</i> advanced techniques for selection and masking

COURSE CODE	COURSE NAME	L	T	P	C
XCA OE2	DIGITAL IMAGING AND EDITING TECHNIQUES	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3
UNIT I INTRODUCTION					9
Introduction to Photoshop basics – tools - palettes and the marvels of undoing – Making selections – repositioning – transforming – cropping					
UNIT II LAYERS					9
Working with layers: adding – organizing – hiding – copying –moving – linking – merging – duplicating – flattening - opacity changes. Fonts - raster vs. vector graphics.					
UNIT III PAINTING TOOLS					9
Viewing related artwork- Technique demos: Digital painting tools - tool option pallets - painting modes - color palettes – gradients - editing brush shapes – creating - saving and loading custom made brushes.					
UNIT IV WORKING WITH COLOURS					9
Photo retouching using color replacement - hue saturation levels -patch tool - cloning stamp - healing brush - sponge tool - dodge - burn tools					
UNIT V ADVANCED TECHNIQUES					9
Advanced selection - masking techniques - layer mask - gradient masking - adjustment layers.					
		LECTURE	PRACTICAL	TUTORIAL	TOTAL
		45	0	0	45
TEXT BOOK					
1. Digital Illustration and Art Techniques covering Photoshop CS3, Derek Lea, Wiley, 2007					
REFERENCE					
1. Photoshop CS Essentials David D. Busch et. al., PHI, 2014.					
E REFERENCE					
1. NPTEL, Digital Image Prof .P. K. Biswas Department of Electronics and Electrical Communication Engineering Indian Institute of Technology, Kharagpur					

XCAOE3 BUSINESS ANALYTICS WITH WORKSHEET

Course Outcomes:

CO1	C	Understanding	<i>Demonstrate</i> Data Management in Worksheet
	P	Guided Response	<i>Organises</i> the data in worksheet
CO2	C	Understanding	<i>Interpret</i> Formulas in an Excel Spread sheet
	P	Perception	<i>Selects</i> formulas for calculating the data in a spread sheet
CO3	C	Apply	<i>Apply</i> Statistical and Mathematical functions for given samples
	P	Guided Response	<i>Manipulate</i> the data with statistical and Mathematical functions
CO4	C	Apply	<i>Apply</i> the types of chart to analyse the data
	P	Guided Response	<i>Displays</i> the chart for any real time data
CO5	C	Understanding	<i>Explain</i> Analysis Toolpak for statistical concepts
	P	Set	<i>Starts</i> to work with Analysis Toolpak

COURSE CODE	COURSE NAME			L	T	P	C
XCAOE3	BUSINESS ANALYTICS WITH WORKSHEET			3	0	0	3
C:P:A = 2:1:0							
				L	T	P	H
				3	0	0	3
UNIT I INTRODUCTION TO WORKSHEET							09
Getting Started with Excel: Excel and Spread Sheets – Excel Workbooks and Worksheets – Worksheet Cells - Excel Add-Ins – Working with Data: Data Entry – Formulas and Functions – Querying Data – Importing Data from Databases.							
UNIT II DATA ANALYSIS IN CHARTS							09
Working with Charts: Excel Charts – Scatter Plots – Editing a chart – Identifying Data Points: Creating Bubble Plots – Breaking a scatter plot into categories – Plotting Several Variable.							
UNIT III STATISTICAL ANALYSIS							09
Describe Data: Variables and Descriptive Statistics - Frequency Tables : Creating a Frequency Table – Using Bins in a Frequency Table – Working with Histograms – Distribution Statistics – Percentiles and Quartiles – Measures of the Center: Means, Medians and the Mode – Measures of Variability – Working with Boxplots.							
UNIT IV STATISTICAL ANALYSIS – Part I							09
Probability Distributions – Normal Distributions – Excel Worksheet Functions – Confidence Intervals – Hypothesis Testing – “t” Distribution.							
UNIT V STATISTICAL ANALYSIS – Part II							09
Pivot tables – Performing a Regression Analysis – Checking the Regression Model – Correlation – Creating Correlation Matrix.							
		LECTURE	PRACTICAL	TUTORIAL	TOTAL		
		45	0	0	45		
TEXT BOOKS							
1. Kenneth N.Berk & Patrick Carey, “Data Analysis with Microsoft Excel”, 3 rd Edition. 2. John Walkenbach, “Microsoft Office Excel 2007”, Wiley Publishing Inc., 2007.							
REFERENCES BOOKS							

1. Curtis Frye, “Step by Step Microsoft Office Excel 2007”, First Edition, Microsoft Press.
2. Marg, Craig Stinson, “Microsoft Office Excel 2007 inside and outside”, First Edition, Microsoft Press.

E REFERENCES

1. NPTEL, Dr.Nandan Sudarsanam, Dr.Balaraman Ravindran, IIT, “Introduction to Data Analytics”.

Course Outcomes:

CO1	C	Understand	Understanding basic concepts of animation
CO2	C	Knowledge	Demonstrate tools and software for animation
CO3	C	Apply	Applying imaging techniques
CO4	C	Apply	Applying various graphic editing techniques
CO5	C	Understand	Differentiate various transformation techniques

COURSE CODE	COURSE NAME	L	T	P	C
XCA OE4	ANIMATION AND IMAGING	3	0	0	3
C:P:A 3:0:0					
		L	T	P	H
		3	0	0	3
UNIT I INTRODUCTION TO ANIMATION					09
Digital 2D Animation orientation – Basic factors affecting the illusion of motion – Impact of digital techniques on the craft of film and video animation – Professional animation practice and job description – Prevailing file format standards and other compatibility issues – History and future trends of computer animation application in the visual arts.					
UNIT II SOFTWARE INTERFACE FOR ANIMATION					09
2D animation application software interface – Default setting and user preferences – Document setup. Import and export formats – Document and timeline window feature – Tools and commands palettes – Media-selection tools and techniques - Asset-management features.					
UNIT III IMAGING TECHNIQUES					09
2D graphics-creation features – Underlying data type: raster – vector – Raster painting and/or import features – Vector shapes – Vector free-form and control-point Placement tools – Features specific to the program in use.					
UNIT IV GRAPHIC EDITING					09
2D graphics editing features – Basic geometric transformation – Boolean Operations on shapes – Object stroke attributes – Object fill attributes – Shading Techniques (blends – gradients) – Packaged effects (extensions – Plug-ins) Features Specific to the program in use.					
UNIT V IMAGE TRANSFORMATION					09
2D animation frame-sequencing features – Straight-ahead animation – Key Frames animation – Motion paths – Applying geometric transformations over time – Intertwining options – Looping and motion – Features specific to the program in use.					
	LECTURE	PRACTICAL	TUTORIAL	TOTAL	
	45	0	0	45	
TEXT					
<ol style="list-style-type: none"> Richard Williams, The Animator's Survival Kit: A Manual of Methods, Principles, and Formulas for Classical, Computer, Games, Stop Motion, and Internet Animators, Faber & Faber Publishing, 2002. Frank Thomas and Olle Johnson, The Illusion of Life: Disney Animation, Disney Editions, 1995. 					
REFERENCES					
<ol style="list-style-type: none"> Preston Blair, Cartoon Animation (How to Draw and Paint series), Walter Foster Publishing, 1994. 					

XCAOE5 MOBILE APPLICATION DEVELOPMENT

Course Outcomes:

CO1	C	Understand	<i>Understand</i> the mobile application architecture.
CO2	C	Understand	<i>Configure and Install</i> Java JDK and Android SDK toolkits.
CO3	C	Knowledge	<i>Describe</i> the user interface and different kinds of layouts.
CO4	C	Application	<i>Implement</i> multimedia applications using android.
CO5	C	Analyze	<i>Create</i> SQL database and establish connectivity with the database.

COURSE CODE	COURSE NAME	L	T	P	C
XCAOE5	MOBILE APPLICATIONS DEVELOPMENT	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3
UNIT I INTRODUCTION					09
Introduction to Mobile Applications - Characteristics - Benefits - Overview of Avaiaboratoryle Technologies - Mobile Application Design - Application Model and Infrastructure - Managing Resources - About Android.					
UNIT II CONFIGURATION OF ANDROID ENVIRONMENT					09
Java JDK – Android SDK – Android Development Tools – Android Virtual Devices (AVDs) – Emulators – JVM – DVM.					
UNIT III USER INTERFACE					09
Understanding the components of a screen -Linear Layout – Absolute Layout – Frame Layout – Relative Layout – Table Layout.					
UNIT IV DESIGNING USER INTERFACE WITH VIEW					09
Text view – Button – Checkbox – Toggle Button, Radio Button, Progress Bar, Auto complete TextView, Spinner – List View, Grid View, Image View, Scroll View.					
UNIT V MULTIMEDIA & DATABASE IN ANDROID					09
Android System Architecture – Play Audio and Video – Text to Speech - SQLite Database – Creation and Connection of the database – Extracting value from a Cursors – Transactions.					
	LECTURE	PRACTICAL	TUTORIAL	TOTAL	
	45	0	0	45	
TEXT					
1. Reto Meier, Professional Android™ Application Development Published by Wiley Publishing, Inc., Copyright © 2009 by Indianapolis, Indiana					
2. Wei-Meng Lee, Android™ Application Development Cookbook: 93 Recipes for Building Winning Apps Published by John Wiley & Sons, Inc., Copyright © 2013 Indianapolis, Indiana.					
REFERENCES					
1. Prasanna Kumar DIXIT , Android , by VIKAS Professional Master , First Edition 2014.					
E – REFERENCES					
1. http://freevideolectures.com/Course/3184/Android-Application-Development#					

XCAOE6 PROGRAMMING IN PYTHON

Course Outcomes:

CO1	C	Understand	<i>Explain</i> various types of operators, Data types, Identifiers and string handling methods.
CO2	U	Understand	<i>Outline</i> the concept of collection data types.
CO3	U	Understand,	<i>Explain</i> the control structures and looping.
	P	Guided Response	<i>Construct</i> programs with control structures.
CO4	U	Understand	<i>Explain</i> Python's standard library, file and Directory handling
CO5	C	Understand	<i>Summarize</i> the object oriented concepts.
	P	Set	<i>Construct</i> a program with OOPS concepts

COURSE CODE	COURSE NAME	L	T	P	C
XCAOE6	PROGRAMMING IN PYTHON	3	0	0	3
C:P:A =2:1:0					
		L	T	P	H
		3	0	0	3
UNIT I INTRODUCTION TO PYTHON PROGRAMMING					09
Creating and Running Python Programs -Data Types-Object References- Collection Data Types-Logical Operations-Control Flow Statements- Arithmetic Operators- Input/Output-Creating and Calling Functions-Examples-Data Types-Identifiers and Keywords-Integral Types-Integers-Booleans--Floating-Point Types-Floating-Point Numbers-Complex Numbers-Decimal Numbers-Strings-Comparing Strings-Slicing and triding Strings-String Operators and Methods-String Formatting with the str.format() Method-Character Encodings.					
UNIT II COLLECTION DATA TYPES					09
Sequence Types-Tuples-Named Tuples-Lists-Set Types-Sets-Frozen Sets-Mapping Types-Dictionaries-Default Dictionaries-Ordered Dictionaries-Iterating and Copying Collections-Iterators and Iterable Operations and Functions-Copying Collections					
UNIT III CONTROL STRUCTURES AND FUNCTIONS					09
Control Structures-Conditional Branching-Looping-Exception Handling-Catching and Raising Exceptions-Custom Exceptions- Custom Functions-Names and Docstrings-Argument and Parameter Unpacking-Accessing Variables in the Global Scope					
UNIT IV MODULES AND PACKAGES					09
Packages-Custom Modules-Overview of Python's Standard Library-String Handling-Command-Line Programming-Mathematics and Numbers-Times and Dates-Algorithms and Collection Data Types-File Formats, Encodings, and Data Persistence-File, Directory, and Process Handling					
UNIT V OBJECTORIENTED PROGRAMMING					09
The Object-Oriented Approach-Object-Oriented Concepts and Terminology-Custom Classes-Attributes and Methods-Inheritance and Polymorphism-Using Properties to Control Attribute Access-Creating Complete Fully Integrated Data Types-Custom Collection Classes-Creating Classes That Aggregate Collections-Creating Collection Classes Using Aggregation-Creating Collection Classes Using Inheritance					
		LECTURE	PRACTICAL	TUTORIAL	TOTAL
		45	0	0	45
TEXT					
I.Mark Summerfield, Programming in Python-A Complete Introduction to Python					

Language, Second Edition, Addison Wesley, 2010.

REFERENCES

1. David M. Beazley, “Python Essential Reference” Third Edition, Sams Publishing 2006.
2. Alex Martelli, Anna Martelli Ravenscroft, and David Ascher, “Python Cookbook”, Third Edition, O’Reilly, 2002.

XCAOE7 SYSTEM AND NETWORK ADMINISTRATION

Course Outcomes:

CO1	C	Understand	Explain the various System Management Principles
	P	Guided Response	Assembles various system components.
CO2	C	Understand	Outline the concept of Operating System
	P	Guided Response	Performs the installation with Operating System
CO3	C	Knowledge	Describe the Host and Server Management
	P	Guided Response	Identifies the Web Server management.
CO4	C	Understand	Demonstrate the Network Management
	P	Guided Response	Constructs the IP configuration and network management
CO5	C	Understand	Describe the Virtualization concepts

COURSE CODE	COURSE NAME	L	T	P	C
XCAOE7	SYSTEM AND NETWORK ADMINISTRATION	3	0	0	3
C:P:A = 2: 1 : 0					
		L	T	P	H
		3	0	0	3
UNIT I SYSTEMS MANAGEMENT					9
Adding/Removing Hardware – Monitoring & Troubleshooting of the system– PC hardware – BIOS, Devices and Drivers – Operating Systems: Linux/Unix – Windows–history & versions.					
UNIT II INSTALLING AN OPERATING SYSTEM					9
Windows –Linux –VMware–Boot Process – Boot Process Steps – Kernel Initialization –Hardware Configuration– Recovery Mode – Activation of Startup Scripts – Dual booting – Single User Mode – Rebooting & Shutting down– Windows: Creating users – workgroup and domain – Active Directory.					
UNIT III HOST MANAGEMENT & SERVER MANAGEMENT					9
Root Privileges – User Management – Disk Storage – Controlling Processes – File System Web Server (Apache & IIS) – DNS Server – Mail Server – Proxy Server					
UNIT IV NETWORK MANAGEMENT					9
Network Configuration – Host Name & IP configuration – Configuration of the Basic Routing and Default Gateway – Name Resolution – Dynamic Host configuration (DHCP) – Configuration of a : Linux Box as a router					
UNIT V VIRTUALIZATION					9
Full virtualization– Para virtualization – Native virtualization – Cloud Computing – Virtualization with Linux – Introduction to Xen					
		LECTURE	TUTORIAL	PRACTICAL	TOTAL
		45	0	0	45
TEXT					
1. Principles of Network and System Administration , Mark Burgess , Oslo University College, Norway Second edition 2004 , John Wiley & Sons Ltd					

REFERENCES

1. The Practice of System and Network Administration, Thomas A. Limoncelli, Christina J. Hogan, Strata R. Chalup, Pearson Education, Second edition 2007

E REFERENCE

1. <http://citeseerx.ist.psu.edu>
2. http://almus.net/docs/System_and_Network_Administration
3. http://www.bit.lk/downloads/syllaboratoryus/sem6/IT6204_Syllaboratoryus.pdf
4. <http://www.nptel.ac.in/downloads/106108101/>

XCAOE8 PHP ANDMYSQL**Course Outcomes:**

CO1 C Understand *Explain* the basic function of PHP and uses of open sources

	P	Guided Response	technologies. Build a program in PHP to implement the looping and conditional statements
CO2	C	Understand	Explain the array and functions in PHP.
	P	Guided Response	Build a program to implement cookies, session and file concept.
CO3	C	Knowledge	Describe the various DB architectures, constraints and normalization forms.
CO4	C	Understand	Explain the statements in MySQL and its effectiveness.
	P	Guided Response	Build a application to construct various queries in MySQL
CO5	C	Understand	Describe to implement PHP and MySQL.
	P	Guided Response	Build an application to implement PHP and MySQL.

COURSE CODE	COURSE NAME	L	T	P	C
XCAOE8	PHP ANDMYSQL	3	0	0	3
C:P:A = 2:1:0					
		L	T	P	H
		3	0	0	3
UNIT I INTRODUCTION TO OPEN SOURCE AND PHP					9
Introduction- open source-PHP – history- features-variables- statements operators- conditional statements-if-switch-nesting conditions-merging forms with conditional statements-loops-while-do-for – loop iteration with break and continue.					
UNIT II ARRAY AND FUNCTIONS					9
Arrays: Array creation and manipulation- using array functions- creating user defined functions- using files- sessions- cookies- executing external programs- Creating sample applications using PHP.					
UNIT III DATABASE MANAGEMENT SYSTEM					9
Components of Database systems-Definition and benefits of database-Data Independence-Three level of database architecture-Database Management System- Client server architecture - Domains-Relations-keys-Primary keys-Foreign keys-Functional dependency(Basic definition)- Normal Forms (1NF, 2NF, 3NF, BCNF)-ER model – OOAD model.					
UNIT IV MySQL					9
Effectiveness of MySQL -MySQL Tools-Prerequisites for MySQL connection- Databases and tables- MySQL data types-Creating and manipulating tables- Insertion, updation and deletion of rows in tables -Retrieving data- Sorting and filtering retrieved data -Advanced data filtering- Data manipulation functions- Aggregate functions -Grouping data- Sub queries- Joining Tables- Set operators- Full text searching					
UNIT V PHP with MySQL					9
Working MySQL with PHP-database connectivity- usage of MYSQL commands in PHP, processing result sets of queries- handling errors-debugging and diagnostic functions- validating user input through Database layer and Application layer- formatting query output with Character, Numeric, Date andtime –sample database applications					
	LECTURE	TUTORIAL	PRACTICALS	TOTAL	
	45	0	0	45	

TEXT

1. Vikram Vaswani, PHP and MySQL, Tata McGraw-Hill, 2005
2. Ben Forta , MySQL Crash course SAMS, 2006.
3. C.J. Date, An Introduction to Database Systems, Addison Wesley, Sixth Edition.
4. Ramesh Elmasri and Shamkant B Navathe, Fundamentals of DataBase Systems, Pearson Education, Third Edition.

REFERENCES

1. Tim Converse, Joyce Park and Clark Morgan, PHP 5 and MySQL, Wiley India reprint, 2008.
2. Robert Sheldon, Geoff Moes, Beginning MySQL, Wrox, 2005

E REFERENCES

1. NPTEL, Database management systems, Dr. Arnab Bhattacharya, IIT Kanpur

Value Added Courses from 2023-2024 for the programmes –BCA in the semesters-III, IV, V and VI

1. VA-XCA-01 – Python Programming

Course Description		
S.No	Topic	Hrs
1.	Environment Setup	4
2.	Fundamentals of Python	4
3.	Control Structures	4
4.	Dictionary, Modules	4
5.	File I/O, Exceptions	4
6.	Classes/Objects	4
7.	Multithreading	4
8.	Database Access	4
9.	Networking	5
TOTAL		37

References:

TEXT

1. Jason Cannon, Python Programming for Beginners, Kindle Edition, 2015.
2. Ramsey Hamilton, Python Programming: A Beginner's Guide to Learn Python in 7 Days, Kindle Edition, 2016

REFERENCES

1. John Paul Mueller & Luca Massaron, Python for Data Sciences for Dummies, Kindle Edition, 2015
2. Dr. Gabriele Lanaro & Quan Nguyen, Learning Path Advanced Python Programming, Kindle Edition, 2019

E REFERENCES

1. https://onlinecourses.nptel.ac.in/noc18_cs35
2. <https://nptel.ac.in/courses/106105166/26>
3. <https://nptel.ac.in/courses/117106113/34>

2. VA-XCA-02 – Cloud Computing

Course Description

S.No	Topic	Hrs
1.	Basics of Cloud Computing	4
2.	Deployment Models	4
3.	Cloud Service Models	4
4.	Computing Management	4
5.	Data storage	4
6.	Virtualization	4
7.	Security	4
8.	Operations	4
9.	Applications & Challenges	5
TOTAL		37

TEXT

- 1.Rao.M.N, Cloud Computing, PHI Publications, 2015
- 2.Srinivasan A, Cloud Computing, Pearson Indian, 2014

REFERENCES

- 1.Ray J Rafaels, Cloud Computing: From Beginning to End, Createspace Independent Publishing Platform, 2015
- 2.Arshdeep Bahga & Vijay K Madisetti, Cloud Computing: A Hands-on Approach, Createspace Independent Publishing Platform, 2013

E REFERENCES

- 1.https://onlinecourses.nptel.ac.in/noc18_cs16/course
- 2.<https://nptel.ac.in/courses/106105167/28>
- 3.<https://nptel.ac.in/courses/126104006/41>

3.VA-XCA-03 – Big Data Analytics

Course Description		
S.No	Topic	Hrs

	Overview	4
2.	Data Life Cycle	4
3.	Methodology	4
4.	Data collection	4
5.	Cleansing Data	4
6.	Summarizing	4
7.	Data Exploration	4
8.	Data Visualization	4
9.	SQL concepts	5
TOTAL		37

TEXT

1. Seema Acharya & Subhashini Chellappan, Big Data Analytics, Wiley Publishers, 2015.
2. David Stephenson, Big Data Demystified, FT Publishing, 2018

REFERENCES

1. Dinesh Kumar U, Business Analytics: The Science of Data Driven Decision Making, Wiley Publications, 2017
2. Jean Paul Isson, Unstructured Data Analytics, Wiley Publications, 2018

E-REFERNCES

1. https://nptel.ac.in/noc/individual_course.php?id=noc19-cs52

4.VA-XCA-04 – R Programming

Course Description		
S.No	Topic	Hrs
1.	Basic Fundamentals	4

	Control Structures	4
3.	Vectors, Lists	4
4.	Arrays	4
5.	Factors	4
6.	Data Frames	4
7.	Packages	4
8.	R Data Interfaces	4
9.	R Charts and Graphs	5
TOTAL		37

TEXT

1. Sandip Rakshit, R Programming for Beginners, Tata Mc Graw Hill Publications, 2017.

REFERENCES

1. Seema Acharya, Data Analytics using R, Tata Mc Graw Hill Publications, 2018.

2. Michael J. Grawley, The R Book, Wiley Publications, 2017.

E REFERENCES

1. <https://nptel.ac.in/courses/111104100/>

2. https://nptel.ac.in/noc/individual_course.php?id=noc18-cs52

3. <https://nptel.ac.in/courses/102101056/9>

5. VA-XCA-05 – IoT

Course Description		
S.No	Topic	Hrs
1.	IoT Overview	4
2.	Hardware	4

	Software	4
4.	Technology & Protocols	4
5.	Common Uses	4
6.	Media, Marketing & Advertising	4
7.	IoT-Environment Monitoring	4
8.	IoT-Energy Applications	4
9.	IoT-Virtualization	5
TOTAL		37

TEXT

1.Olivier Hersent, David Boswarthick, The Internet of Things: Key applications and protocols, Wiley Publications, 2015

REFERENCES

1.Kai Hwang, Min Chen, Big Data Analytics for Cloud,IoT and Cognitive Computing, Wiley Publications, 2017.

2.Adrian Mcewen, Hakin Cassimally, Designing the Internet of Things, Wiley Publications, 2015.

E REFERENCES

1. <https://nptel.ac.in/courses/108108098/4>

2. <https://nptel.ac.in/courses/106105166/>

6 VA-XCA-06 – Advanced Java Programming

Course Description		
S.No	Topic	Hrs

	Environment Setup	4
2.	Fundamentals of JAVA	4
3.	Applets	4
4.	Servlet	4
5.	RMI	4
6.	JDBC	4
7.	CORBA	4
8.	Swing	4
9.	Networking	5
TOTAL		37

TEXT

1. Patrick Naughton , Herbert Schildt, JAVA2- The Complete Reference, Tata McGraw Hill,Fifth Edition, New Delhi, 2002.
2. Jeffrey C.Jackson, “Web Technologies A Computer Science Perspective” Pearson Education, 2007.
3. Stephen Asbury, Scott R. Weiner, Wiley, Developing Java Enterprise Applications, 1998
4. D.Norton and H.Schildt, Java2: The Complete Reference, TMH 2000.
5. E.Balagurusamy, Programming with Java, A primer second edition, Tata McGraw Hill, New Delhi.

REFERENCES

1. Deitel H M and Deitel P J, “JAVA-How to Program”, Prentice Hall of India Private Limited, New Delhi, 2008.
2. D.Jana, Java and Object oriented Programming Paradigm, PHI, New Delhi, 2005.
3. Cay S.Horstman,Gary Cornell, “Core Java “, Volume I, II, Eighth Edition, Pearson Education, 2008.
4. Tom Valesky, “Enterprise Java Beans”, Pearson Education, 2002.
5. Jeremy Rosenberger,”Teach Yourself CORBA in 14 days”, Tech media, 2000.

E REFERENCES

3. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
4. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
5. <http://freevideolectures.com/Course/2513/Java-Programming>.

6. VA-XCA-07 – Natural Language Processing

Course Description		
S.No	Topic	Hrs
1.	Introduction	4

	N-gram Language Models	4
3.	Part Of Speech Tagging and Sequence Laboratoryeling	4
4.	Basic Neural Networks	4
5.	LSTM Recurrent Neural Networks	4
6.	Syntactic parsing	4
7.	Semantic Analysis	4
8.	Information Extraction (IE)	4
9.	Machine Translation (MT)	5
TOTAL		37
TEXT		
1.An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, by Daniel Jurafsky and James H. Martin.		
REFERENCES		
1. urafsky, David, and James H. Martin. <i>Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition</i> . Upper Saddle River, NJ: Prentice-Hall, 2000. ISBN: 0130950696		
E REFERENCES		
1. https://nptel.ac.in/courses/106/105/106105158/		

8. VA-XCA-08 – RBA-Run Book Automation

Course Description

S.No	Topic	Hrs
1.	Introduction of runbook automation-needs of runbook automation	4
2.	Running into automated runbooks: centralize workflow-Process and process and Working agreements	4
3.	Running into automated runbooks: Build action plans-Runbooks-Inline with alerting and communication tools	4
4.	Rundeck-Automation tools to assist with automating runbook,Devops and other IT operations tasks	4
5.	Confluences-documentation storage and organization	4
6.	Service now/Jira-Ticket tracking for incident management	4
7.	Slack-Realtime communication and collaboratoryoration	4
8.	Victorups-incident response and collaboratoryoration solution	4
9.	Project	5
TOTAL		37

TEXT

1. IT Operations Run Book Automation, by David Williams, Gartner. May 4, 2007.

REFERENCES

1. Don Krapohl. "An Integrated Approach to Organizational Transformation". AugmentedIntel. Don Krapohl. Retrieved 1 May 2013.

E REFERENCES

1. <https://nptel.ac.in/courses/106/105/106105158/>

9.VA-XCA-09 – DevOps

Course Description

S.No	Topic	Hrs
1.	AWS Cloud Formation Documentation	4
2.	Understanding Devops Mindsets	4
3.	Devops Principles	4
4.	CI and CD Principles	5
5.	Version Control and Version control Tools	5
6.	Working With AWS Power Shell	5
7.	Understanding Application Life Cycle Management	5
8.	Implementing Test Case Using Jenkin Pipeline	5
TOTAL		37

TEXT
1. Learn Azure DevOps CI/CD pipelines Create CI/CD pipelines for Java, .NET, NodeJs, Docker, Terraform, Nuget, Xamarin, SQL Server and ARM templates
REFERENCES
1. DevOps - The Complete Guide, Docker, Git and Github
E REFERENCES
1. https://nptel.ac.in/courses/128106012 2. https://elearn.nptel.ac.in/shop/iit-workshops/completed/cicd-devops-automation-and-devsecops-automation/

10.VA-XCA-10 – AWS

Course Description

S.No	Topic	Hrs
1.	Linux Fundamentals	4
2.	AWS Overview	4
3.	EC2 Instance	4
4.	Auto Scaling	4
5.	Load Balancing	4
6.	Object Storage in Cloud	4
7.	Cloud Front	4
8.	Amazon Virtual Private Cloud	4
9.	AWS Troubleshooting	5
TOTAL		37

TEXT
1. Saurabh Shrivastava, Neelanjali Srivastav, Alberto Artasanchez, “AWS for Solutions Architects Build and migrate your workload to Amazon Web Services using the cloud-native approach”, 2nd Edition (Kindle Edition)
REFERENCES
1. JAMES HORN , “AMAZON WEB SERVICES FOR NEWBIES A Beginner's Guide to Cloud Computing with AWS (Kindle Edition)”, Jan 13, 2023
E REFERENCES
1. https://elearn.nptel.ac.in/shop/iit-workshops/completed/amazon-web-services-aws/

11.VA-XCA-11 – Google Cloud

Course Description

S.No	Topic	Hrs
1.	A unified approach to the cloud	4
2.	Connect Google Cloud SQL with Apps and Tools	4
3.	Google App Engine	4
4.	New Project with Cloud Resource Manager API Client for .NET	4
5.	New Project with Cloud Resource Manager API Client for Python	4
6.	Technical deep-dive	4
7.	The cloud maturity phases	4
8.	The cloud maturity scale	4
9.	The epics	5
TOTAL		37

TEXT
1. Sparx Systems , “ GoogleCloudPlatform(GCP)”,2022
REFERENCES
1. Valliappa Lakshmanan , “Data Science on the Google Cloud Platform”, "O'Reilly Media, Inc.", 2022
E REFERENCES
1. https://nptel.ac.in/courses/106105223

12.VA-XCA-12 – Go Programming

Course Description		
S.No	Topic	Hrs
1.	Go programming language	4
2.	Identifiers in Go Language	4
3.	Control Statements	4
4.	String Variables	4
5.	Integer Variables	4
6.	Arrays	4
7.	Slices	4
8.	Maps	4
9.	Variadic Functions	5
TOTAL		37

TEXT
1. Jeremy Cook, “ Go Programming”, 2022
REFERENCES
1. CALEB DOXSEY, “An Introduction to Programming in Go”,2012
E REFERENCES
1. https://github.com/cloudacademy/learn-go
2. https://github.com/cloudacademy/godemo

Articulation Matrix

Course Code	C	P	A	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	L	T	P	C
XCA103	4	0	0	14	10	10	5	5	5	5	7	5	4	0	0	4
XCA104	5	0	0	15	5	0	0	5	0	5	0	0	4	1	0	5

XCA105	4	0	0	14	13	10	10	10	5	5	10	10	4	0	0	4
XCA106	1	0	0	14	10	10	5	5	5	5	7	5	0	0	1	1
XCA203	4	0	0	14	13	10	10	10	5	10	13	13	4	0	0	4
XCA204	4.5	0.2 5	0.2 5	15	3	0	1	5	0	5	0	0	4	1	0	5
XCA205	3	0	0	14	13	10	10	10	5	5	15	10	3	0	0	3
XCA206	4	0	0	15	13	10	10	10	5	10	15	13	4	0	0	4
XCA207	1	0	0	14	13	10	10	10	5	10	13	13	0	0	1	1
XCA208	1	0	0	15	13	10	10	10	5	10	15	13	0	0	1	1
XCA304	4	0	0	15	13	10	10	10	5	10	15	15	4	0	0	4
XCA305	4	0	0	15	15	10	10	10	5	10	15	15	4	0	0	4
XCA306	5	0	0	15	5	0	0	5	0	5	0	0	3	2	0	5
XCA307	1	0	0	15	13	10	10	10	5	10	15	15	0	0	1	1
XCA403	1	0	0	15	13	10	10	10	5	10	13	13	1	0	0	1
XCA405	4	0	0	15	15	11	11	11	5	10	13	15	4	0	0	4
XCA406	4	0	0	14	13	10	10	10	5	10	13	13	4	0	0	4
XCA407	1	0	0	15	13	10	10	10	5	10	13	13	0	0	1	1
XCA408	1	0	0	15	15	11	11	11	5	10	13	15	0	0	1	1
XCA409	1	0	0	14	13	10	10	10	5	10	13	13	0	0	1	1
XCA501	1	0	0	15	13	10	10	10	5	10	13	15	1	0	0	1
XCA502 A	5	0	0	14	13	10	10	10	5	5	15	10	4	1	0	5
XCA502 B	5	0	0	14	13	10	10	10	5	5	15	10	4	1	0	5
XCA503 A	5	0	0	14	13	10	10	10	5	10	13	13	4	1	0	5
XCA503 B	5	0	0	15	14	10	10	10	5	10	13	15	4	1	0	5
XCA504 A	5	0	0	14	13	10	10	10	5	5	10	10	4	1	0	5
XCA504 B	5	0	0	14	13	10	10	10	5	5	10	10	4	1	0	5
XCA505	1	0	0	15	13	10	10	10	5	10	13	15	0	0	1	1
XCA506 A	1	0	0	14	13	10	10	10	5	10	13	13	0	0	1	1
XCA506 B	1	0	0	15	14	10	10	10	5	10	13	15	0	0	1	1
XCA601	1	0	0	15	13	10	10	10	5	10	15	15	1	0	0	1
XCA602 A	5	0	0	15	13	10	10	10	5	10	15	15	4	1	0	5
XCA602 B	5	0	0	14	13	10	10	10	5	10	13	13	4	1	0	5
XCA603 A	5	0	0	14	13	10	10	10	5	5	10	10	4	1	0	5
XCA603	5	0	0	15	14	10	10	10	5	5	10	10	4	1	0	5

B																
XCA603 C	5	0	0	14	13	10	10	10	5	5	10	10	4	1	0	5
XCA604	1	0	0	15	13	10	10	10	5	10	13	15	0	0	1	1
XCA605 A	1	0	0	15	13	10	10	10	5	10	15	15	0	0	1	1
XCA605 B	1	0	0	14	13	10	10	10	5	10	13	13	0	0	1	1
XCA606	0	6	2	10	10	10	10	10	10	10	15	15	0	0	6	6
Total	120. 5	6.2 5	2.2 5	57 7	49 4	37 2	36 3	37 7	19 0	33 0	475	466	9 3	1 5	1 9	12 7

