PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

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

Criterion 1 – Curricular Aspects

Key Indicator 1.1 Curriculum Design and Development

Metric 1.1.3 Average percentage of courses having focus on employability/ entrepreneurship/ skill Development offered by the Computer Science and Applications

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

SYLLABUS COPY OF THE COURSES HIGHLIGHTING THE FOCUS ON EMPLOYABILITY/ ENTREPRENEURSHIP/ SKILL DEVELOPMENT

1. List of courses for the programmes in order of

S. No.	Programme Name
	i. Bachelor of Computer Applications (Full Time)
	ii. B.Sc Data Science (Full Time)
	iii. Master of Computer Applications (Full Time)

2. Syllabus of the courses as per the list.

Legend : Words highlighted with **Blue Color** - Entrepreneurship
Words highlighted with **Red Color** - Employability
Words highlighted with **Green Color** - Skill Development

Course Code	Name of the Course	Year of introduction	Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development
BCA			
2022-23 ACADEMIC YEAR (ODD and EVEN)			
XGT101/ XFT101	Tamil I/Foundational Tamil I	2022-23	**Skill development** - Group Discussion , Spoken and Written communication
XGE102	English I	2022-23	**Skill development**: -Group Discussion , Spoken and Written communication
XCA103	C Programming	2014-15	**Employability**: Improving programming skill of students
XCA104	Algebra, Calculus and Analytical Geometry	2015-16	**Skill development**: -Solving the real world problem by mathematically
XCA105	Computer Organization and Architecture	2015-16	**Employability,** Seminar, Quiz , Assignment , Case Study, **P**roject Work,
XUM001	Human Ethics, Values, Rights and Gender Equality	2014-15	**Skill development: -**Solving the real world problem by ethics
XCA106	C Programming Lab	2021-22	**Employability**: Improving programming skill of students
XGT201/XFT201	Tamil II/Foundational Tamil II	2020-21	**Skill development** - Group Discussion , Spoken and Written communication
XGL202	English II	2015-16	**Skill development: -**Solving the real world problem by understanding environment
XCA203	Object Oriented Programming with C++	2015-16	**Employability**: Improving programming skill of students
XCA204	Discrete Mathematics	2015-16	**Skill development**: -Solving the real world problem by mathematically
XCA205	Computer Networks	2018-19	**Employability**: Improving programming skill of students
XCA206	Data Structures and Algorithms	2015-16	**Employability**: Improving programming skill of students
XCA207	Object Oriented Programming with C++ Laboratory	2021-22	**Employability**: Improving programming skill of students
XCA208	Data Structures and Algorithms Laboratory	2015-16	**Employability**: Improving programming skill of students
XUM002	Environmental Studies	2015-16	**Skill development: -**Solving the issues in the real world problem by ethics

XCA302	HTML and DHTML	2016-17	**Employability**: Improving programming skill of students
XCA303	Database Management Systems	2015-16	**Employability**: Improving programming skill of students
XCA304	Visual Programming	2016-17	**Employability**: Improving programming skill of students
XCA305	Statistical and Numerical Methods	2015-16	**Skill development: -**Solving the real world problem by mathematically
OE	Open Elective	2015-16	******
XUMA301	Disaster Management	2019-20	**Skill development: -**Solving the real world problemby understading environment
XCA306	HTML and DHTML Lab	2016-17	**Employability**: Improving programming skill of students
XCA307	Database Management Systems -Lab	2015-16	**Employability**: Improving programming skill of students
XCA308	Visual Programming Lab	2021-22	**Employability**: Improving programming skill of students
XCA401	Data Analytics	2019-20	**Employability**: Improving programming skill of students
XCA402	Java Programming	2016-17	**Employability**: Improving programming skill of students
XCA403	Resource Management Techniques	2015-16	**Skill development: -**Solving the real world problem by mathematically
XCA404	Operating Systems	2015-16	**Employability**: Improving programming skill of students
OE	Open Elective	2015-16	******
XVM406	Entrepreneurship Development	2015-16	**Entrepreneurship-** Improving Entrepreneurship skills in business
XCA407	Data Analytics Lab	2021-22	**Employability**: Improving programming skill of students
XCA408	Java Programming Lab	2016-17	**Employability**: Improving programming skill of students
XCA409	Operating Systems Lab	2021-22	**Employability**: Improving programming skill of students
XCA501	XML and Web Services	2016-17	**Employability**: Improving programming skill of students
XCA502A	Software Engineering	2016-17	**Employability**: Improving programming skill of students

XCA503A	Unix and Shell Programming	2015-16	**Employability**: Improving programming skill of students
XCA504A	Enterprise Resource Planning	2017-18	**Entrepreneurship**: Improving Entrepreneurship skills in business
OE	Open Elective	2019-20	******
XCA505	Android App Development - Mobile Technology	2019-20	**Employability**: Improving programming skill of students
XCA506	Inplant Training	2017-18	**Employability**: Improving programming skill of students
XCA601	Introduction to Graphics Design	2016-17	**Employability**: Improving programming skill of students
XCA602A	.Net Technologies	2016-17	**Employability**: Improving programming skill of students
XCA603A	Mobile Computing	2017-18	**Employability**: Improving programming skill of students
XCA604	Project Work	2020-21	**Employability**: Improving programming skill of students
B.Sc Data Science			
2022-23 ACADEMIC YEAR (ODD and EVEN)			
XGT101/ XFT101	Tamil I/Foundational Tamil I	2021-22	**Skill development** - Group Discussion , Spoken and Written communication
XGE102	English I	2021-22	**Skill development**: -Group Discussion , Spoken and Written communication
XDS103	C Programming	2014-15	**Employability**: Improving programming skill of students
XDS104	Algebra, Calculus and Analytical Geometry	2015-16	**Skill development**: -Solving the real world problem by mathematically
XDS105	Computer Organization and Architecture	2015-16	**Employability** Seminar, Quiz , Assignment , Case Study, **P**roject Work,
XUM001	Human Ethics, Values, Rights and Gender Equality	2014-15	**Skill development: -**Solving the real world problem by ethics
XDS106	C Programming laboratory	2022-23	**Employability**: Improving programming skill of students
XGT201/XFT201	Tamil II/Foundational Tamil II	2021-22	**Skill development**- Group Discussion , Spoken and Written communication

XGL202	English II	2021-22	**Skill development: -**Solving the real world problem **by** understanding environment
XDS203	Object Oriented Programming with C++	2015-16	**Employability**: Improving programming skill of students
XDS204	Discrete Mathematics	2015-16	**Skill development: -**Solving the real world problem by mathematically
XDS205	Computer Networks	2018-19	**Employability**: Improving programming skill of students
XDS206	Data Structures and Algorithms	2015-16	**Employability**: Improving programming skill of students
XDS207	Object Oriented Programming with C++ Laboratory	2022-23	**Employability**: Improving programming skill of students
XCA208	Data Structures and Algorithms Laboratory	2022-23	**Employability**: Improving programming skill of students
XUM002	Environmental Studies	2022-23	**Skill development: -**Solving the issues in the real world problem by ethics
MCA			
2022-23 ACADEMIC YEAR (ODD and EVEN)			
YCA101	Database Management Systems	2019-20	**Employability**: Improving programming skill of students
YCA102	Computer Networks	2020-21	**Employability**: Improving programming skill of students
YCA103	Object Oriented Programming, Analysis and Design	2019-20	**Employability**: Improving programming skill of students
YCA104	Management Support Systems	2019-20	**Employability**: Improving programming skill of students
YCA105	Mathematical Foundation for Computer Applications	2020-21	**Employability**: Improving programming skill of students
YCA106	Database Management Systems Lab	2019-20	**Employability**: Improving programming skill of students
YCA107	Mathematical Foundation for Computer Applications Lab using Java	2020-21	**Employability**: Improving presentation skill of students
YCA201	Advanced Operating System Concepts	2014-15	**Employability**: Improving programming skill of students
YCA202	Software Engineering	2019-20	**Employability**: Improving programming skill of students

YCAEE1	Data Mining and Data Warehousing	2014-15	**Employability**: Improving programming skill of students
YCA203	Advanced Data Structures	2020-21	**Employability**: Improving programming skill of students
YCABM4	Investment Technology	2019-20	**Employability**: Improving programming skill of students
YCA205	Advanced Operating System Concepts Lab	2020-21	**Employability**: Improving programming skill of students
YCA206	Case Tools Lab	2019-20	**Employability**: Improving programming skill of students
YCA301	Artificial Intelligence and Machine Learning	2020-21	**Employability**: Improving programming skill of students
YCA302	Graphics and Multimedia	2015-16	**Employability**: Improving programming skill of students
YCAEE6	Image Processing	2014-15	**Employability**: Improving programming skill of students
YCABM2	Corporate Planning	2019-20	**Employability**: Improving programming skill of students
YCA303	Optimization Techniques	2020-21	**Employability**: Improving programming skill of students
YCA304	Artificial Intelligence and Machine Learning Lab using Python	2020-21	**Employability**: Improving programming skill of students
YCA305	Optimization Techniques Lab	2020-21	**Employability**: Improving programming skill of students
YCA306	Industrials Lectures	2020-21	**Employability**: Improving programming skill of students
YCA307	Mini Project	2020-21	**Employability**: Improving programming skill of students
YCA401	Research Methodology(Paper Publications)	2020-21	**Employability**: Improving programming skill of students
YCA402	Project	2013-14	**Employability**: Improving programming skill of students

BCA

Academic Year: 2022-2023

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	Nil	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(),fewind()-fgetc(), fputc(), fscanf()-program using files	

LECTURE	TUTORIAL	PRACTICAL	TOTAL
60	0		60

TEXT

1. Programming in ANSI 8th Edition,935316513X · 9789353165130 By E Balagurusamy

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REFERENCES

1. YashwantKanetker, 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.

E REFERENCES

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

XCA104 ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY

Course Outcome:

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

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
X CA 104	**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	TOTAL
60	15	75

TEXT BOOKS

1.T. K. ManicavachagomPillay, T. Natarajan, K. S. Ganapathy, Algebra, Volume I , S.Vishvanathan Printers and Publishers Pvt., Ltd, Chennai 2004.

2. S.Naravanan, T.K.ManicavachagamPillay, 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.

E REFERENCES

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	**Summarizes** 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	TOTAL
60	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	Nil	**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	PRACTICAL	TOTAL
	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	***Relate*** and ***Interpret*** the human ethics and human relationships	Cognitive	Remember, Understand
CO2	***Explain*** and ***Apply*** gender issues, equality and violence against women	Cognitive	Understand, Apply
CO3	***Classify*** and ***Develop*** the identify of women issues and challenges	Cognitive & Affective	Analyze Receive
CO4	***Classify*** and ***Dissect*** human rights and report on violations.	Cognitive	Understand, Analyze
CO5	***List*** and **respond** 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 - 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 IIGENDER 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. Ambethkar, Thanthai Periyar and Phule to Women Empowerment.

UNIT IIIWOMEN 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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
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		L	T	P	H
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. BjarneStroustrup, “The C++ Programming Language”, Pearson Education, 2014.
2. Stanley B. Lippman, JoseeLajoieandBarbara 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.

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COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA204	**DISCRETE MATHEMATICS**	**4**	**1**	**0**	**5**
C:P:A =4.5:0.25:0.25					
		L	**T**	**P**	**H**
PREREQUISITE	Basic Mathematics	**4**	**1**	**0**	**5**

UNIT- I: SET OPERATIONS	**15**
Set notations – Basic definitions and set operations – Venn diagram – Algebraic laws of set theory – D Morgan's law. Relations: Properties of relations – Types of relations – Equivalence classes. Functions: Definition – Domain – Range and types of function- Classification of function.	
UNIT- II: NORMAL FORMS	**15**
Statements - Normal forms – CNF – DNF – PCNF - PDN – Tautologies - Contradictions.	
UNIT – III: PERMUTATION AND COMBINATION	**15**
Counting principles – The Pigeonhole principle – Counting – Permutations and Combinations – Combinatorial arguments – Countable and uncountable sets.	
UNIT- IV: LATTICES	**15**

Lattices as partially ordered set – Types of lattices – Lattices as algebraic system.

UNIT- V: GROUPS **15**

Binary operations – Semi groups - Groups – Examples and elementary properties.

	LECTURE	TUTORIAL	TOTAL
	60	15	75

TEXT

1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, 2002.
2. Kenneth Levasseur and Alan Doerr, "Applied Discrete Structures, Department of Mathematical Sciences, University of Massachusetts Lowell, Version 2.0, 2013.

REFERENCES

1. Kenneth H.Rosen, "Discrete Mathematics and its Application", Fifth edition, Tata McGraw-Hill Publishing company pvt.Ltd., New Delhi,2003.
2. Kenneth H.Rosen, "Discrete Mathematics and its Applications: With Combinatorics and Graph Theory", Tata McGraw-Hill Education Pvt. Ltd, 2015.
3. Dr.M.K.Venkataraman, Dr.N.SridharanN.Chandrasekaran, "Discrete Mathematics", the National Publishing Company, 2003.
4. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics, 10th edition,Tata McGraw Hill,2010.

E REFERENCES

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, Bangalore.

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

COURSE CODE	COURSE NAME	L	T	P	C
XCA205	COMPUTER NETWORKS	3	0	0	3
C:P:A =3:0:0					
		L	T	P	H
PREREQUISITE	Nil	3	0	0	3

UNIT-I : OVERVIEW OF COMPUTER NETWORKS	**09**
Network hardware- Network software- Protocol Hierarchies – Layering – Interfaces, services, primitives – OSI reference Model – TCP/IP reference model – physical layer – transmission media - Wireless transmission – switching.	
UNIT – II : DATA LINK LAYER	**09**
Services of DLL – Framing – Flow control – Error control – Error detection codes – Error correction codes – DLL protocol – Stop and Wait protocol –Sliding Window Protocol - HDLC – DLL in the internet	
UNIT-III: NETWORK LAYER	**09**
Services of Network Layer - Routing – Shortest Path Routing Algorithm – Congestion Control – General Principle of Congestion Control Inter Network Routing – Network Layer in the Internet – IP protocol –IP address – subnets – internet control protocol	
UNIT- IV : TRANSPORTATION LAYER	**09**
Services of Transportation Layer – Addressing –Establishing and Releasing Connection – Flow Control – Buffering –Multiplexing – The Internet Transportation Protocol TCP and UDP Model – Connection Management – TCP Congestion Control.	
UNIT- V: APPLICATION LAYER	**09**
DNS – Name Space –Resource – Records – Name Servers - Email – Architecture and Services – User Agent – Message Format and Transfer – USENET Implementation – WWW Client and Server Sides – Locating Information on the Web	

LECTURE	TUTORIAL	PRACTICALS	TOTAL
45	0	0	45

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=10610 5081

	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	0	0	2	2

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:

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

4. Implement the operations on singly linked list.
5. Implement the following operations on a binary search tree.
   a. (i) Insert a node (ii) Delete a node
6. Create a binary search tree and do the following traversals
   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
   (i) Depth first search (ii) Breadth first search

	LECTURE	PRACTICAL	TUTORIAL	TOTAL
	0	15	0	15

	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	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Remember Understand
CO2	***Illustrate*** the significance of ecosystem, biodiversity and natural geobio chemical cycles for maintaining ecological balance.	Cognitive	Understand
CO3	***Identify*** the facts, consequences and apply the preventive measures of major pollutions and ***recognize*** and the disaster phenomenon.	Cognitive Affective	Apply Receiving
CO4	***Explain*** the socio-economic, policy dynamics and***practice*** the control measures of global issues for sustainable development.	Cognitive	Understand Analyse
CO5	***Recognize*** the impact of population and the concept of various welfare programs, and explain themodern 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**

Structure and function of an ecosystem – Producers, consumers and decomposers –Biogeochemical cycles- Food chains, Food webs, Structure and Function of the Forest ecosystem and Aquatic ecosystem– Introduction to Biodiversity- Endemic, Extinct and Endangered species- Conservation of Biodiversity: In-situ and Ex-situ conservation

UNIT – III ENVIRONMENTAL POLLUTION **3+3**

Definition – Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards – Solid waste management: Causes, effects and control measures of industrial wastes – Role of an individual in prevention of pollution – Pollution case studies

UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT **3+3**

Rain water harvesting– Resettlement and Rehabilitation of people, Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and Holocaust – Environment Protection Act – Water Act – Wildlife Protection Act – Forest Conservation Act.

UNIT –VHUMAN POPULATION AND THE ENVIRONMENT **3+3**

Population growth, Variation among nations - Population explosion - Environment and Human health- HIV / AIDS – Role of Information Technology in Environment and human health – Case studies.

	LECTURE	TUTORIAL	TOTAL
	30	0	30

TEXT BOOKS

1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, (2000).
2. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, (2003).
3. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, (2003).
4. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, (2006).
5. Introduction to International disaster management, Butterworth Heinemann, (2006).
6. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, (2004).

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1. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, (2009).
2. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, (2001).
3. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi (2012).
4. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, (2003).
5. Sundar, Disaster Management, Sarup& Sons, New Delhi, (2007).
6. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, (2006).

E RESOURCES

1. http://www.e-booksdirectory.com/details.php?ebook=10526
2. https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science
3. https://www.free-ebooks.net/ebook/What-is-Biodiversity
4. https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4
5. http://bookboon.com/en/pollution-prevention-and-control-ebook
6. http://www.e-booksdirectory.com/details.php?ebook=8557
7. http://www.e-booksdirectory.com/details.php?ebook=6804
8. http://bookboon.com/en/atmospheric-pollution-ebook
9. http://www.e-booksdirectory.com/details.php?ebook=3749
10. http://www.e-booksdirectory.com/details.php?ebook=2604

11. http://www.e-booksdirectory.com/details.php?ebook=2116
12. http://www.e-booksdirectory.com/details.php?ebook=1026
13. http://www.faadooengineers.com/threads/7894-Environmental-Science

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

XCA302 HTML AND DHTML

Course Outcomes:

CO1	C	Remembering	***List*** out the tags of Text Formatting and Tables
CO2	C	Understanding	***Demonstrate*** the List, Links and Images.
CO3	C	Apply	***Explain*** Frames in HTML for developing the webpage
CO4	C	Understanding	***Explain and Develop*** static web page with HTML form
CO5	C	Understanding	***Explain*** DHTML with Java script and CSS

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA302	**HTML AND DHTML**	**1**	**0**	**0**	**1**
C:P:A = 1:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Nil	**01**	**0**	**0**	**1**

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

XCA303 DATABASE MANAGEMENT SYSTEMS

Course Outcomes:

CO1	C	Knowledge	***Describe*** the database architecture and its applications
CO2	C	Understand	***Discuss*** about the relational algebra and calculus
CO3	C	Knowledge	***Describe*** the various normalization forms
CO4	C	Understand	***Explain*** the storage and accessing of data.
CO5	C	Understand	***Illustrate*** the query processing in database management.

COURSE CODE	COURSE NAME	L	T	P	C
XCA303	DATABASE MANAGEMENT SYSTEMS	4	0	0	4
C:P:A = 4: 0: 0					
		L	T	P	H
PREREQUISITE	Nil	4	0	0	4

UNIT- I : DATABASE ARCHITECTURE AND ER DIAGRAM — **12**

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**: e**ntity 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 — **12**

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 — **12**

Pitfalls in relational database design – Decomposition – Functional dependencies – Normalization – First normal form – Second normal form – Third normal form – Boyce-codd normal form – Fourth normal form – Fifth normal form

UNIT- IV: STORAGE AND FILE ORGANIZATION — **12**

Disks - RAID -Tertiary storage - Storage Access -File Organization – organization of files - Data Dictionary storage

UNIT- V: QUERY PROCESSING AND TRANSACTION MANAGEMENT — **12**

Query Processing - Transaction Concept - Concurrency Control –Locks based protocol- Deadlock Handling

	LECTURE	TUTORIAL	PRACTICALS	TOTAL
	60	0	0	60

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, 7th Edition, 2015

E REFERENCES

1. NPTEL, Introduction to database desigh, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. NPTEL, Indexing and Searching TechniquesinDatabasesDr. ArnabBhattacharya,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

XCA304 VISUAL PROGRAMMING

Course Outcomes:

CO1	C	Knowledge	***Understand*** basic controls and events
CO2	C	Understand,	***Recognize***various controls for different applications
CO3	C	Understand,	***Describe*** and ***apply***intrinsic and extrinsic controlsin programming
CO4	C	Understand, Apply	***Understand*** and ***implement*** connections and operations in database
CO5	C	Understand, Apply	***Understand*** and ***Implement*** various VC++ controls & events

COURSE CODE	COURSE NAME	L	T	P	C
XCA304	VISUAL PROGRAMMING	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	Nil	4	0	0	4
UNIT- I :INTRODUCTION ON WINDOWS PROGRAMMING					**12**

Overview of Windows Programming - Event driven programming – GUI concepts - Data Types – Resources – Windows Messages - Basic Drawings: GDI – Device Context –Dots and Lines - creating the window – displaying the window - Text Output

UNIT- II: VISUAL BASIC PROGRAMMING **12**

Introduction – Forms – Variables, Types – Properties, methods, events – Decision Making – Looping – Select Case - Modules – Arrays – Built-in functions - Procedures – Functions-Tool Box Controls – Responding to mouse events – Drag and drop events Responding to keyboard events – KEYPRESS, KEYUP, KEYDOWN events - shape and line control.

UNIT- III: ADVANCED CONTROLS **12**

Menu bar - Tool bar - Message box - Input box - Dialog box - MDI – Tree view – List view – Tab strip - – File System Controls : File List Box – Directory List Box – Drive List Box – File System Objects - Projects with Multiple Forms - Do Events and Sub Main - Error Trapping

UNIT- IV: ODBC AND DATABASE ENGINES **12**

Database Manager – Data Control – Record set Objects – DAO – Manipulation of records – Database Management with ODBC – RDO –ADO – ADO Control – Data Grid Control – Database Applications

UNIT- V: VISUAL C++ **12**

VC++ Components – MFC - Resources – Getting started with AppWizard – Class Wizard - Modal and Modeless Dialogs – Document View Architecture

LECTURE	TUTORIAL	PRACTICAL	TOTAL
60	0	0	60

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, 10th Edition, 2017

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

XCA305 STATISTICAL AND NUMERICAL METHODS

Course Outcomes:

CO1	C	Remember Understand	***Explain***the statistical data in the form of table,diagram and graphand to ***find***various statistics, correlation, rank correlation and regression coefficients.
CO2	C	Remember Apply	***Define*** null and alternate hypothesis and to ***Apply*** test statistic.
CO3	C	Remember	***Define***discrete and continuous randomvariables and to ***Find*** the expected values and moment generating functions of discrete and continuous distributions.
CO4	C	Understand Apply	***Explain***computational numericalmethods to ***Solve*** algebraic and 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
XCA305	STATISTICALAND NUMERICAL METHODS	3	2	0	5
C:P:A = 5:0:0		L	T	P	H
PREREQUISITE	Basic Mathematics	3	2	0	5

UNIT- I : MEASURES OF CENTRAL TENDENCY — **15**

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 — **15**

Sampling distributions - Tests for single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – χ2-test for goodness of fit – Independence of attributes.

UNIT- III: PROBABILITY DISTRIBUTIONS — **15**

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 — **15**

Numerical solution of Algebraic & Transcendental Equations - Bisection method – Newton Raphson method. Numerical solution of Simultaneous Linear Algebraic Equation – Gauss Elimination method – Gauss Jordon Elimination method – Gauss Seidel method and Gauss – Jacobi method.

UNIT- V: NUMERICAL DIFFERENTIATION AND INTEGRATION — **15**

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	30	75

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,25th 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

XCA306 HTML AND DHTML LAB

Course Outcomes:

CO1	P A	Set Responding	***Starts*** to work with Text Formatting tags ***Performs*** data organization in List and tables with variety of samples
CO2	P A	Guided Response Responding	***Builds*** the web site with List, Links and Images. ***Selects*** the necessary tag used for designing the website.
CO3	P	Guided Response	***Assembles*** all the web sites linked with Frames
CO4	A	Guided Response	***Develop*** static web page with HTML form elements ***Compiles*** the form element in a web document.
CO5	P A	Guided Response Responding	***Practices*** with CSS, Java Script and DHTML ***Organizes*** the Dynamic web pages with static webpages

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA306	**HTML AND DHTML LAB**	**0**	**0**	**1**	**1**
C:P:A = 0:0.5:0.5		**L**	**T**	**P**	**H**
PREREQUISITE	Nil	**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	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	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

XCA307 DATABASE MANAGEMENT SYSTEMS -LAB

Course Outcomes:

CO1	C A	Apply Receive	***Sketch*** the ER diagram for real world applications ***Uses*** various ER diagram for a similar concepts from various sources
CO2	P A	Guided Response Respond	***Construct*** various queries in SQL and PL/SQL ***Compiles*** various queries in SQL, Relational Calculus and Algebra
CO3	C A	Apply Receive	***Apply*** the normalization concepts for a table of data ***Practices*** a table and implement the normalization concepts
CO4	C A	Apply Receive	***Apply*** the cursor concept by develop queries ***Practices*** PL/SQL Procedure using cursor
CO5	C A	Apply Receive	***Apply*** the PL/SQL function ***Practices*** PL/SQL Procedure using function

COURSE CODE	COURSE NAME	L	T	P	C
XCA307	**DATABASE MANAGEMENT SYSTEMS LAB**	**0**	**0**	**1**	**1**
C:P:A = 0: 0.75: 0.25					
		L	**T**	**P**	**H**
PREREQUISITE	Nil	**0**	**0**	**2**	**2**
					30

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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.
11. Write a PL/SQL procedure for an application using functions
12. Write a PL/SQL procedure for an application using package

	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

XCA308 VISUAL PROGRAMMING-LAB

Course Outcomes:

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

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA308	**VISUAL PROGRAMMING -LAB**	**0**	**0**	**1**	**1**
C:P:A = 0:1:0					
		L	**T**	**P**	**H**
PREREQUISITE	VB	**0**	**0**	**2**	**2**
LAB				**30**	

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

	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

XCA401 DATA ANALYTICS

Course Outcomes:

CO1	C	Understanding	***Demonstrate*** Data Management in Worksheet
CO2	C	Understanding	***Interpret*** Formulas in an Excel Spread sheet
CO3	C	Apply	***Apply*** Statistical and Mathematical functions for given
CO4	C	Apply	***Apply*** the type of charts to analyse the data
CO5	C	Understanding	***Explain*** Analysis Toolpak for statistical concepts

COURSE CODE	COURSE NAME	L	T	P	C
XCA401	DATA ANALYTICS	1	0	0	1
C:P:A = 1:0:0					
		L	T	P	H
PREREQUISITE	Nil	1	0	0	1
UNIT -I :INTRODUCTION TO WORKSHEET					5

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 | **5**

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 | **5**

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.

LECTURE	PRACTICAL	TOTAL
15	0	15

TEXT

1. Kenneth N.Berk& Patrick Carey, "Data Analysis with Microsoft Excel", 3rd 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

XCA402 JAVA PROGRAMMING

Course Outcomes:

CO1	C	Understand	***Explain*** the history and features of java
CO2	C	Understand	***Describe*** and ***implement*** the class, packages and interfaces
CO3	C	Understand	***Describe*** and ***implement*** the inheritance concepts
CO4	C	Understand	***Describe*** and ***implement*** various types of exception and its handling methods
CO5	C	Understand	***Illustrate*** the Applets methods in Graphics, AWT controls and event handling

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA402	**JAVA PROGRAMMING**	**4**	**0**	**0**	**4**
C:P:A = 4:0 :0					
		L	**T**	**P**	**H**
PREREQUISITE	C++ Programming	**4**	**0**	**0**	**4**

UNIT- I: INTRODUCTION	**12**
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	**12**
Classes-Objects-Wrapper Classes-Packages and Interfaces-extending interfaces-implementing interfaces-abstract methods.	
UNIT- III: INHERITANCE	**12**
Inheritance Extending classes-overriding methods-finalize methods-Abstract and Final classes-Interfaces and Inheritance.	
UNIT- IV: EXCEPTION HANDLING	**12**
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	**12**
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**
60		**0**	**60**

TEXT

1.E. Balagurusamy ,"Programming With Java ",Tata Mcgraw Hill Education Private Limited,4th Edition, 2009

2. Y. Daniel Liang,"Introuction to java programming",PearsonPublication,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://freevideolectures.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

XCA 403 RESOURCE MANAGEMENT TECHNIQUES

Course Outcomes:

CO1	C	Understanding Apply	***Explain*** the basic concepts of optimizationand to formulate and ***Solve***Linear Programming problems.
CO2	C	Understanding Apply	***Explain*** and ***Apply*** the concepts of Transportation problem and Assignment problem.
CO3	C	Understanding Apply	***Explain*** and Apply the concepts of sequencing problem
CO4	C	Apply	***Explain*** and ***Demonstrate*** the basic concepts of PERT-CPM and their applications in product planning control.
CO5	C	Understanding Apply	***Solve*** 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**
XCA403	**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

XCA404 OPERATING SYSTEMS

Course Outcomes:

CO1	C	Understanding	***Explain*** the operating system functions
CO2	C	Understanding	***Implement*** the process and various process scheduling algorithms
CO3	C	Knowledge	***Outline*** process cooperation and inter process communication
CO4	C	Understanding	***Describe*** various memory management concepts
CO5	C	Understanding	***Implement*** and ***understand*** the file organization

COURSE CODE	COURSE NAME	L	T	P	C
XCA404	OPERATING SYSTEMS	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	C++ concepts, Windows Programming	4	0	0	4

UNIT I OVERVIEW OF OPERATING SYSTEMS — **12**

Functionalities and objectives of operating Systems- processor register- instruction execution- interrupts- types of interrupts.

UNIT IIPROCESS MANAGEMENT — **12**

Process concepts: process states- process control block- process and threads- processor scheduling- scheduling algorithms.

UNIT IIIPRINCIPLES OF CONCURRENCY — **12**

Critical Sections - Mutual Exclusion - Process Cooperation- Inter Process Communication- Deadlock Prevention- Detection- Avoidance- Semaphores- Monitors-Message Passing.

UNIT IVMEMORY MANAGEMENT — **12**

Virtual Memory Concepts- Paging and Segmentation- Address Mapping- Virtual Storage Management- Page Replacement Strategies.

UNIT V FILE ORGANIZATION — **12**

Blocking and buffering, file descriptor- file and directory structures- I/O devices- disk scheduling.

LECTURE	TUTORIAL	PRACTICALS	TOTAL
60	0	0	60

TEXT

1. William Stallings, Operating Systems , Prentice Hall of India (P) Ltd, 7th 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

XCA407 DATA ANALYTICS LAB

Course Outcomes:

CO1	P A	Guided Response Responding	***Organizes*** the data in worksheet ***Performs*** data organization in worksheet with variety of samples
CO2	A	Responding	***Interpret*** Formulas in an Excel Spread sheet ***Selects*** formulas for calculating the data in a spread sheet
CO3	P	Guided Response	***Manipulate*** the data with statistical and Mathematical functions
CO4	P	Guided Response	***Displays*** the chart for any real time data
CO5	P A	Set Responding	***Starts*** to work with Analysis built in tools ***Practices*** built in tools with different samples

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA407	**DATA ANALYTICS LAB**	**0**	**0**	**1**	**1**
C:P:A = 0:0.5:0.5		**L**	**T**	**P**	**H**
PREREQUISITE	Nil	**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	**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	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

XCA408 JAVA PROGRAMMING LAB

Course Outcomes:

CO2	A	Apply Response	***Implement*** the class, packages and interfaces ***Participating*** in creating packages and interfaces for applications domain.
CO3	P	Apply Set	***Implement*** the inheritance concepts ***Implement*** various level of inheritance for given applications
CO4	P	Apply GR	***Implement*** various types of exception and its handling methods ***Build*** a program to implement exception handling concepts
CO5	P	Apply	***illustrate*** the Applets methods in Graphics, AWT controls and event handling ***Build*** an application using event handling method

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA408	**JAVA PROGRAMMINGLAB**	**0**	**0**	**1**	**1**
C:P:A = 0:0.5 :0.5		**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 .

XCA409 OPERATING SYSTEMS LAB

Course Outcomes:

CO1	P	Adapt	Implement the CPU Scheduling algorithms
CO2	P	Adapt	***Implement*** the process and various process scheduling algorithms ***Executes*** the different types of scheduling algorithms
CO3	A P	Receive Guided Response	***Recognize*** the principles of concurrency ***Builds*** a program model for deadlock prevention and avoidance
CO4	A P	Organize Adapt	***Integrates*** different memory management techniques ***Apply*** the fixed size and variable size page replacement algorithm
CO5	P	Guided Response	***Implement*** and ***understand*** the file organization

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA409	**OPERATING SYSTEMS LAB**	**0**	**0**	**1**	**1**
C:P:A = 0:0.5:0.5					
		L	**T**	**P**	**H**
PREREQUISITE	C++ concepts, Windows Programming	**0**	**0**	**2**	**2**
					30

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
7. Simulate Bankers Algorithm for deadlock Prevention
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

LECTURE	**TUTORIAL**	**PRACTICALS**	**TOTAL**
0	**0**	**30**	**30**

	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

XCA501 XML AND WEB SERVICES

Course Outcomes:

CO1	C	Understanding	***Explain*** the concepts of XML
	P	Set	***Starts*** to work with XML tags
CO2	C	Understanding	***Demonstrate*** the XML schema and DTD
	P	Guided Response	***Builds*** the middleware with XML schema and DTD
CO3	C	Understanding	***Explain*** the XML presentation and Transformation technique
	P	Guided Response	***Assembles*** all the CSS tags to represent the XML data
CO4	C	Understanding	***Outline*** the Web Services Building Block
CO5	C	Understanding	***Adapt*** the XML concepts to work with Webservices
	P	Guided Response	***Organizes*** the webservices with XML tags
	A	Responding	***Uses*** the XML concepts to perform the Webservices

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA501	**XML AND WEB SERVICES**	**1**	**0**	**1**	**2**
C:P:A = 1:0.5:0.5					
		L	**T**	**P**	**H**
PREREQUISITE	HTML Concepts	**1**	**0**	**2**	**3**
UNIT- I: FUNDAMENTALS OF XML				**15**	
Role of XML - XML and the Web - XML Language Basics - SOAP - Web Services - Revolutions of XML - Service Oriented Architecture (SOA). Lab: 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.					
UNIT –II: XML TECHNOLOGY FAMILY				**15**	

XML - Name Spaces - Structuring With Schemas and DTD - Presentation Techniques - Transformation - XML Infrastructure.

Lab:

1. Create a XML document to store resumes for a job web site and create the External DTD file.
2. Create a XML schema for the book's XML document.
3. Present the book's XML document using cascading style sheets (CSS).
4. Write a XSLT program to extract book titles, authors, publications, book rating from the book's XML document and use formatting.

UNIT – III: WEB SERVICES BUILDING BLOCK **15**

Overview Of SOAP - HTTP - XML-RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns and Faults - SOAP with Attachments

Lab:

1. Use Microsoft DOM to navigate and extract information from the book's XML document.
2. Create a web service for temperature conversion with appropriate client program.

LECTURE	PRACTICAL	TOTAL
15	30	45

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", PearsonEducation, 2005.
3. SandeepChatterjee 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 8	PSO 9
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	***Explain***the various types of software process models
CO2	C	Understand	***Illustrate*** *the* ***c***oncept of software planning activities, risk management and estimation
CO3	C	Knowledge	***Describe*** the various software design models
CO4	C	Understand Understand	***Derive*** and ***Illustrate*** the test case and various testing methods
CO5	C	Understand	***Summarize*** 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 — **15**

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 — **15**

Project management - Project planning – Resources – Project estimation - Software project scheduling- Risk management - System engineering — Requirements engineering

UNIT- III: SOFTWARE DESIGN — **15**

Design concepts – Design models – Pattern based design – Architectural design – Component level design – User interface : analysis and design

UNIT- IV: SOFTWARE TESTING — **15**

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 — **15**

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	TOTAL
60	15	75

TEXT

1. Roger Pressman.S., Software Engineering: A Practitioner's Approach, Sixth Edition, Mcgraw Hill, 2008.
2. JalotePankaj, 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 8	PSO 9
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	Understanding	***Explain*** UNIX operating system and architectures
	P	Guided Response	***Builds*** an operating system environment to work with various applications.
	A	Responding	***Performs*** networking commandsin an operating system
CO2	C	Understanding	***Explain*** UNIX File Systems and Commands
	A	Responding	***Selects*** commands to perform the execution
CO3	C	Understanding	***Describe*** the operating system processes and its execution
	P	Guided Response	***Manipulate*** the UNIX processes
CO4	C	Understanding	***Explain*** the Shell Environment concepts
	P	Guided Response	***Displays*** the Shell environment and processing technique
CO5	C	Understanding	***Explain*** Shell Programming statements
	P	Set	***Starts*** to work with Shell Programming
	A	Responding	***Practices*** the Shell programming control structures

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA503A	**UNIX AND SHELL PROGRAMMING**	**4**	**0**	**1**	**5**
C:P:A = 3:1.5:0.5		**L**	**T**	**P**	**H**
PREREQUISITE	Basic Concepts of Programming, Design	**4**	**0**	**2**	**6**

UNIT- I:INTRODUCTION TO UNIX **18**

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.

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.

UNIT –II: FILE SYSTEM **18**

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.

Lab:

1. Use seed instruction to process /etc/password file.
2. Shell scripts to check and list attributes of processes.

UNIT- III: PROCESS	18

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.

Lab:

1. Write awk script that uses all of its features.
2. Write a shell script to display list of users currently logged in.
3. Write a shell script to delete all the temporary files.

UNIT- IV: SHELL	18

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.

Lab:

1. Write a shell script to ask your name, program name and enrolment number and print it on the screen.
2. Write a shell program to exchange the values of two variables.

UNIT- V: SHELL PROGRAMMING	18

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.

Lab:

1. Write a shell program to find the Fibonacci series.
2. Write a shell program to concatenate two strings and find the length of the resultant string.
3. Write a shell program to find factorial of given number.
4. Write a shell program to find the sum of all the digits in a given number.
5. Write a shell program to find the sum of the series sum=1+1/2+…+1/n.
6. Write a shell program to check whether a given string is palindrome or not.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	60		30	90

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 8	PSO 9
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

XCA504A ENTERPRISE RESOURCE PLANNING

Course Outcomes:

CO1	C	Understanding	***Explain***the functionalities of Enterprise resource planning
CO2	C	Understanding	***Characterize*** the ERP implementation procedures
CO3	C	Knowledge	***Describes*** the elements of ERP
CO4	C	Understanding	***Differentiate*** the available ERP packages
CO5	C	Understanding	***Summarize*** 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 **15**

ERP: An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM

UNIT- II: ERP IMPLEMENTATION **15**

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contract with Vendors.

UNIT- III: THE BUSINESS MODULES **15**

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

UNIT- IV: ERP PACKAGES **15**

ERP Market Place, SAP AG, PeopleSoft, Baan, JD Edwards, Oracle, QAD, SSA

UNIT- V: ERP –PRESENT AND FUTURE **15**

Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions

LECTURE	TUTORIAL	TOTAL
60	15	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 Elecrical Communication Engg., IIT, Kharagpur

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 8	PSO 9
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

XCA601 INTRODUCTION TO GRAPHICS DESIGN

Course Outcomes:

CO1	C	Understand	***Understand*** various image file formats and attributes
CO2	P	Set	***Working*** with various images for different manipulations
CO3	C	Knowledge	***Understand*** painting and color options and tools
CO4	P	Set	***Design*** various invitations, posters and logo
CO5	P	Set	***Design*** a brochure, card and website

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XCA601	**INTRODUCTION TO GRAPHICS DESIGN**	**1**	**0**	**1**	**2**
C:P:A = 1:1:0					
		L	**T**	**P**	**H**
PREREQUISITE	Basic Concepts of Programming, Design	**1**	**0**	**2**	**3**
UNIT -I : IMAGE AND FILE FORMATS					**5**
Image formats: Vector format - Pixel format - File Compression - File formats: Properties of Bitmap Images- Monitor resolution- Image resolution- Resolution for printing- Resolution for display- Pixilation- Interpolation.					
UNIT- II: INTRODUCTION TO GIMP					**5**
Introduction to Vector Shapes and Bitmaps- Exploring the GIMPEnvironment- Using the file Browser Basic Photo Corrections					
UNIT- III: WORKING WITH SELECTION TOOLS					**5**
Basics- Masks and Channels Retouching and Repairing- Working with Brushes- Customizing Brushes- Speed Painting- Matte Painting- Creating a workspace for painting- Using Color Palette- Painting and Editing. Basic Pen Tool- Techniques- Vectors Masks- Paths and Shapes- Advanced Layer Techniques.					
Lab:					**30**

1. Create a poster for any event using GIMP
2. Make an album using GIMP
3. Create an invitation for a party
4. Create a post card with background scene
5. Make a web environment using GIMP
6. Make a template for web page using GIMP
7. Converting 2D logo into 3D view logo
8. Make a colorful brochure in GIMP
9. Business card design in GIMP
10. Using the blend effect in creating a vector flame
11. Website layout design in GIMP

	LECTURE	PRACTICAL	TOTAL
	15	30	45

TEXT BOOKS

1. Beginning GIMP: From Novice to Professional, Akkana Peck, Paper Back, Second Edition, 2008
2. Adobe Photoshop CC Bible, Lisa DaNaeDayley, Brad Dayley, 2014

REFERENCES

1. GIMP Pocket Reference, Sven Neumann, OReilly, 2000
2. GIMP Essential Reference, Alex Harford, Pearson Education, 1999

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 8	PSO 9
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

XCA 602A .NET TECHNOLOGIES

Course Outcomes:

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

COURSE CODE	COURSE NAME	L	T	P	C
XCA 602A	.NET TECHNOLOGIES	4	0	1	5
C:P:A = 4:1:0		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	4	0	2	6

UNIT- I:INTRODUCTION TO .NET TECHNOLOGIES — **18**

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# — **18**

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.

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

UNIT- III: INTRODUCTION TO VB.NET — **18**

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.

Lab:

1. Develop an application for deploying various built-in functions in VB.NET
2. Develop an MDI application for Employee Pay-roll transactions in VB.NET

UNIT- IV: APPLICATION DEVELOPMENT ON .NET — **18**

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 applications

Lab:

1. Construct a console application to demonstrate the OOP Concepts
2. Develop a web application in VB.NET for dynamic Login Processing

UNIT- V: ADO .NET CONNECTIVITY — **18**

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.NET

Lab:

1. Develop a Windows application with database connectivity for core-banking transactions

	LECTURE	PRACTICAL	TUTORIAL	TOTAL
	60	30	0	90

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 8	PSO 9
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

XCA603A MOBILE COMPUTING

Course Outcomes:

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

COURSE CODE	COURSE NAME	L	T	P	C
XCA603A	MOBILE COMPUTING	4	1	0	5
C:P:A = 4.5:0:0.5					
		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	TOTAL
60	15	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	PO2	PO3	PO4	PO5	PO6	PO7	PSO 8	PSO 9
3	3	2	2	2	1	1	2	2	3
3	3	2	2	2	1	1	2	2	3
3	3	2	2	2	1	1	2	2	3
3	2	2	2	2	1	1	2	2	3
2	2	2	2	2	1	1	2	2	2
14	13	10	10	10	5	5	10	10	14
3	3	2	2	2	1	1	2	2	3

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

COURSECODE	COURSE NAME	L	T	P	C
XCA602	Project Work	0	1	8	6
C:P:A = 0:3:2					
		L	T	P	H
		0	1	8	9

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

MCA

ACADEMIC YEAR 2020-2021

YCA101- DATABASE MANAGEMENT SYSTEMS

Course Outcomes:

CO1	C	Knowledge	***Describe*** the database architecture and its application
CO2	C	Understand	***Describe*** about the relational model and algebra
CO3	C	Understand	***Explain*** the data model and accessing of data.
CO4	C	Knowledge	***Describe*** the normalization concept for a table of data
CO5	C	Understand	***Illustrate*** the query technical processing in database management

Course Code	Course Name	L	T	P	C
YCA101	Data Base Management Systems	4	1	0	4
C:P:A = 4:0:0		L	T	P	H
		4	1	0	5

UNIT- I: Introduction to database Management System **15**

Basic concepts-Database & Database Users-Characteristics of the Database-Database Systems-Concepts & Architecture-Date Models. Schemas & Instances-DBMS Architecture & Data Independence-Data Base languages & Interfaces-Data Modeling using the Entity-Relationship Approach

UNIT- II : Relational Model Concept **15**

Relational Model - Languages &Systems - Relational-Data Model & Relational -Algebra Relational Model Concepts-Relational Model Constraints-Relational Algebra-SQL – A Relational Database Language-Date Definition in SQL-View & Queries in SQL-Specifying Constraints & Indexes in SQL-Specifying Constraints & Indexes in SQL a Relational Database Management Systems-ORACLE/INGRES

UNIT- III : Data model **15**

Conventional Data Models & Systems Network-Data Model & IDMS Systems Membership types & options in a set DML for the network model-Navigation within a network database-Hierarchical Data Model & IMS System-Hierarchical Database structure- HSAM - HISAM - HDAM & HIDAM organization-DML for hierarchical model-Overview of IMS

UNIT- IV: Relational Data Base Design **15**

Relational Data Base Design-Function Dependencies & Normalization for Relational -

Databases - Functional Dependencies-Normal forms based on primary keys (INF, 2NF, 3NF & BCNF)-Lossless join & Dependency preserving decomposition

UNIT- V: Concurrency Control & Recovery Techniques **15**

Concurrency Control & Recovery Techniques-Concurrency Control Techniques-Locking Techniques-Time stamp ordering-Granularity of Data items-Recovery Techniques-Recovery concepts-Database backup and recovery from catastrophic failures - Concepts of Object oriented data base management systems

	LECTURE	TUTORIAL	TOTAL
	60	15	75

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. Date, C.J., "An Introduction to Database Systems", Narosa Publishing House, NewDelhi.
2. Desai, B'., "An Introduction to Database Concepts", Galgotia Publications, New Delhi.
3. Elmsari and Navathe, "Fundamentals of Database Systems", Addison Wesley, New York.
4. Ullman, J.D., "Principles of Database Systems", Galgotia Publications, New Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	3	2	2	3	3
CO 2	3	3	3	2	2	2	2	2	3	3
CO 3	3	2	2	2	2	2	2	2	3	3
CO 4	2	3	2	2	2	2	2	2	2	2
CO 5	3	2	2	2	2	2	2	2	2	2
Total	14	13	12	11	11	11	10	10	13	13
Course	3	3	3	3	3	3	1	1	3	3

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

YCA102 COMPUTER NETWORKS

Course Outcomes:

CO1	C	Understand	***Define*** various methods of topology
CO2	C	Understand	***Understand*** and apply layer protocol
CO3	C	Understand	***Illustrate*** various counting and inclusion theory
CO4	C	Understand	***Describe*** LAN concepts
CO5	C	Understand	***Explain*** TCP/IP

Course Code	Course Name	L	T	P	C
YCA102	Computer Networks	4	1	0	4
C:P:A = 4:0:0		L	T	P	H
		4	1	0	5

UNIT- I: Introduction to computer network **15**

Advantages of networks - structure of the communications network - point-to-point and multidrop circuits - data flow and physical circuits - network topologies - topologies and design goals - Hierarchical topology - horizontal topology (Bus) - star topology - ring topology - mesh topology - The telephone network - switched and non-switched options - fundamentals of communications theory - channel speed and bit rate - voice communications and analog waveforms - bandwidth and the frequency spectrum - connecting the analog and digital worlds - digital worlds - digital signals - the modem - asynchronous and synchronous transmission - Wide area and local networks - connection oriented and connectionless networks, classification of communications protocols - time division multiple access (TDMA) - time division multiplexing (TDM) - carrier sense (Collision) systems - token passing - peer-to-peer priority systems - priority slot - carrier sense (collision free) systems - token passing (priority) systems.

UNIT- II: Layered Protocols and the OSI model **15**

Goals of Layered Protocols - network design problems - communication between layers - introduction to standard organizations and the OSI model - standards organizations - Layers of OSI - OSI status - Polling/Selection Protocols : Character and bit protocols - binary synchronous control (BSC) HDLC - HOLC options - HDLC frame format - code transparency and synchronization - HDLC transmission process - HDLC subsets - SDLC - Protocol conversion.

UNIT- III:Local Area Networks **15**

Way LANs - Primary attributes of a LAN - Broadband and baseband and base LANs - IEEE LAN standards - e1ationship of the 802 standards to the ISO/CCITT model - connection options with LANs - LLC and MAC protocol data units - LAN topologies and protocols - CSMA/CO and IEEE 802.3 - token ring (Priority) - token bus and IEEE 802.4 - metropolitan area networks (MANs) - ANSI fiber distributed data interface - Switching and Routing in Networks**:** Message switching - packet switching - when and when not to use packet switching - packet routing - packet switching support to circuit switching networks.

UNIT- IV: The X.25 Network and Supporting Protocols **15**

Features of X.25 - Layers of X.25 and the Physical layer - X.25 and the data link layer - companion standards to X.25 - features of X.25 - X.25 channel options - flow control principles - other packet types - X.25 logical channel states - packet formats - Internet working - connectionless mode networks - the frame relay and X.25 stacks.

UNIT- V: TCP/IP and Personal Computer Networks **15**

TCP/IP and internetworking - example of TCP/IP operations - related protocols ports and sockets - The IP address structure - major features of IP - IP datagram - Major IP services - IP

source routing - value of the transport layer - TCP - Major features of TCP - passive and active operation - the transmission control block (TCP) - route discovery protocols - examples of route discovery protocols - application layer protocols

Personal computer communications: Characteristics - error handling - using the personal computer as a server - linking the personal computer to mainframe computers - tilt: transfer on personal computers - personal computers and local area networks - network operating systems (NOSs) - common IBM PC LAN protocol stacks.

	LECTURE	TUTORIAL	TOTAL
	60	15	75

TEXTBOOK

1. Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Prentice Hall PTR; 4th edition, 2002
2. Computer Networking: A Top-Down Approach, by J. F. Kurose and K. W. Ross, Addison Wesley, 5th Edition, March 2009, ISBN-13: 978-0136079675. (Chapters 1-6)

REFERENCE

1. Black, V., "Computer Networks· Protocols, Standards and Interfaces", Prentice Hall of India, 1996
2. Stallings, W., "Computer Communication Networks", (4th edition). Prentice Hall of India.1993.Tanneabaum, A.S .. "Computer Networks", Prentice Hall of India, 19'81.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCA103 - OBJECT ORIENTED PROGRAMMING, ANALYSIS AND DESIGN

Course Outcomes

CO1	C	Knowledge	***Describe*** various methods to define object modelling
CO2	C	Understand	***Understand*** and construct modeling concepts
CO3	C	Knowledge	***Describe*** and ***Discuss the*** concepts of operations
CO4	C	Knowledge	***Describe*** and apply the concepts of designs
CO5	C	Knowledge	***Describe*** the concepts of implementation of an application

Course Code	Course Name	L	T	P	C
YCA103	Object Oriented Programming, Analysis and Design	4	0	0	4
C:P:A = 4:0:0		L	T	P	H
		4	0	0	4

UNIT- I: Object modeling	**12**
Object modelling: Objects and classes - Links and associations - Generalization and inheritance.	
UNIT- II: Grouping constructs	**12**
Grouping constructs - Aggregation - Generalization as extension and restriction -Multiple inheritance - Meta data - candidate keys - Dynamic modelling: Events and states Nesting – Concurrency	
UNIT – III: Functional modeling	**12**
Functional modelling: Data flow diagrams - Specifying operations - Analysis: Object modelling - Dynamic modelling - functional modelling - Adding operations - Iteration.	
UNIT- IV: System design and object design	**12**
System design: Subsystems - Concurrency - Allocation to processors and tasks - Management of data stores - Control implementation -. Boundary condition - Architectural frameworks - Object design: Optimization - implementation of control - Adjustment of inheritance - Design of associations - Documentation - Comparison of methodologies.	
UNIT -V : Implementation	**12**
Implementation: Using a programming language - a database system - Programming styles - reusability - extensibility - robustness - Programming-in-the-large - case study.	

LECTURE	TUTORIAL	TOTAL
60	0	60

TEXT

1. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education, 2005
2. Alan Dennis, Barbara H. Wixom, and David Tegarden, Systems Analysis And Design with UML Version 2.0—An Object-Oriented Approach, 3nd edition, John Wiley & Sons, Inc., 2009 (required)
3. T5. Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison Wesley.
4. OBJECT-ORIENTED ANALYSIS AND DESIGN With applications SECOND

EDITION Grady Booch Rational Santa Clara, California
REFERENCES
1. Booch, G., "Object Oriented Analysis and Design". 2nd edition, Benjamin/Cummins Publishing Co .. Redwood City, CA, U.S.A., 1994. 2. Rebecca Wirfs-Brock, et. al, Designing Object Oriented Software", Prentice Hall of India.1996. 3. Rumbaugh, J., Et al "Object Oriented Modelling and Design". Prentice Hall of India, New Delhi, 1991

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCA104-MANAGEMENT SUPPORT SYSTEMS

Course Outcomes

CO1	C	Knowledge	***Discuss***about DSS concept and components
CO2	C	Understand	***Describe***the data and model management for DSS
CO3	C	Knowledge	***Describe***about various DSS functionality
CO4	C	Understand	***Understand***the concept of DSS Interface and Group discussion
CO5	C	Understand	***Describe*** Expert System

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA104	**Management Support Systems**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0		**L**	**T**	**P**	**H**
		3	**0**	**0**	**3**
UNIT- I: Introduction					**09**
Introduction to the concept of Decision Support System - Components of DSS - Dialogue Management					

UNIT –II: Decision Support System	**09**
Data Management and Model Management for DSS - Examples of different type of DSS - Systems Analysis and Design for DSS	
UNIT – III: DSS functionality	**09**
Models in the context of DSS - Algorithms and Heuristics - DSS Applications in different functions	
UNIT- IV:Interface and Group Discussion	**09**
Design of interfaces in DSS - An overview of DSS generators - Group Decision in Support Systems (GDSS) and Decision Conferencing.	
UNIT -V :Introduction of Expert Systems	**09**
Introduction of Expert Systems - Expert Systems in Management - Case Study on Expert System - Introduction to GlS - MSS based on GIS - Case Studies; Executive Information Systems (EIS).	

	LECTURE	**TUTORIAL**	**TOTAL**
	45	**0**	**45**

TEXT

1. 1.Lucas, H.C., "Information system concepts for management", 5th edition, McGraw Hill,New York. 1994.
2. W S Jawadekar , A O'Brien .,"Management Information Systems"
3. Laaudon and Ludon, "Management Information Systems".

REFERENCES

1. Bhatnagar, S.C. and Ramani K. V., "Computers and Information Management", Prentice Hall of India. New Delhi, 1992.
2. Issue dedicated of GDSS & Expert Systems, JMIS, 10, 3, 1993-94.
3. Kroenke, D., "Management information systems", 2nd edition, Mitchell McGraw Hill, New York. 1992.
4. Maryam Alvi, "Group Decision support Systems, Info. Sys. Mgt (ISM)", Vol. 8. No.3 Summer 91 .
5. Sprauge, R.H., and McNurlin, B.C., "Information Systems Management in Practice", 3rd ed.
6. Prentice Hall international. New Jersey, 1993.
7. Sprague. R.H. and Carlson, E.D . ."Building Effective Decision Support Systems", Prentice Hall. New Jersey, 1982.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	1	1
CO 2	2	1	1	1	1	1	1	1	1	1
CO 3	2	2	1	1	1	1	1	1	1	1
CO 4	2	2	1	1	1	1	1	1	1	1
CO 5	1	2	1	1	1	1	1	1	1	1
Total	09	08	05	05	05	05	05	05	05	05
Course	03	02	01	01	01	01	01	01	01	01

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

YCA105 - MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

Course Outcomes:

CO1 C Knowledge ***Discuss*** *the basic fundamentals of statistics and measures*

CO2 C Understand ***Identify*** *the concept of sampling technique*

CO3 C Knowledge ***Describe*** about the charts and analysis

CO4 C Understand ***Discuss*** about the statistics analysis

CO5 C Understand ***Describe*** *the various implementation*

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA105	**Mathematical foundation for Computer Applications**	**4**	**1**	**0**	**5**
C:P:A = 5:0:0		**L**	**T**	**P**	**H**
		4	**1**	**0**	**5**
UNIT- I: Introduction					**15**
Basic Statistics: Measures of central tendencies - Measures of dispersion - Frequency distributions - Moments - Correlation coefficient - Regression.					
UNIT- II: Sampling statistical computing					**15**
Sampling: Theory of sampling - population and sample - Survey methods and estimation Statistical inference - Testing of hypothesis and inference					
UNIT- III: Statistics For Business					**15**

Computing frequency charts - Regression analysis.	
UNIT- IV: Data Analysis	**15**
Time series and forecasting	
UNIT- V: Implementation	**15**
Implementation: Using a programming language - a database system - Programming styles - reusability - extensibility - robustness - Programming-in-the-large - case study.	

	LECTURE	**TUTORIAL**	**TOTAL**
	60	**15**	**75**

TEXT

1. Tanner, M. A..," *Tools for Statistical Inference:Methods for the Exploration of Posterior Distribution" Springer Verlag: New York.,third Eition.,1996*

REFERENCES

1. Affi, A.A., "Statistical Anal);sis: A Computer Oriented Approach". Academic Press, New York, 1979. Hogg. R. v..Et. Al., "Introduction to Mathematical Statistics", American Publishing, New York. 1980.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	2	2	1	2	2	2	2	2	2
CO 2	3	2	2	2	2	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	1	2	2	2	2	2	2
CO 5	2	2	2	2	2	2	2	2	2	2
Total	12	10	10	8	10	10	10	10	10	10
Course	3	2	2	1	2	2	2	2	2	2

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

YCA106 -DATABASE MANAGEMENT SYSTEMS LAB

Course Outcomes:

CO1	P	Guided response	***Build***the concept of DBMS programming and its fundamental
CO2	P	Guided response	***Build*** an application program using concepts
CO3	P	Apply Guided Response	***Develop*** an application program using a data model ***Develop***the query technical processing in database managements
CO4	P	Guided response	***Explain*** and ***Implement***the normalization concept for a table of data
CO5	A	Apply	Apply the query technical processing in database managements

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA106	**Database Management Systems Lab**	**0**	**0**	**4**	**2**
C:P:A = 0:1.5:0.5		**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**
					60`

1. Create table in SQL using Accounting for a shop database
2. Develop a Database design in E-R model and Normalization using Database manager for a magazine agency or newspaper agency
3. Implement the Nested Queries using Ticket booking for performances
4. Create views for a particular table using Preparing greeting and birth day cards Personal accounts - insurance, loans, mortgage payments etc.
5. Implement Join operations in SQL using Doctor's diary, billing
6. create a program to implement JDBC connectivity using Personal bank account
7. create a program to implement ODBC connectivity using Class marks management
8. Create a webpage for Video tape library using JDBC Connectivity
9. How to update a data by using JDBC connectivity with Personal library.
10. Create a webpage for Class marks management library using JDBC Connectivity.
11. Write PL/SQL procedure for an application using Hostel accounting
12. Write PL/SQL procedure for an application using History of cricket scores
13. Write PL/SQL procedure for an application using Cable transmission program manager

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2

CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

YCA107 - MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS LAB USING JAVA

Course Outcomes:

CO1	P	Guided Response	***Practice*** *the basic* Computer generation of random numbers
CO2	A	Apply	***Understand*** and apply set theory and Relations
CO3	P	Guided Response	***Describe*** various counting and inclusion theory
CO4	A	Apply	***Apply***frequency charts for large data sets
CO5	A	Apply	***Apply*** statistical package to perform factor analysis and tests of significance

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA107	**Mathematical Foundation for Computer Applications Lab using Java**	**0**	**0**	**4**	**2**
C:P:A = 0:1:1		**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**
					60

1. Computer generation of random numbers with different distributions.
2. Writing a questionnaire analysis program for data from surveys.
3. Analysis of significance of the results of survey.
4. Curve fitting to experimental data.
5. Programs to obtain frequency charts for large data sets and fitting a distribution.
6. Use of a statistical package to perform factor analysis and tests of significance.
7. Calculating and displaying regression statistics.
8. Real Statistics Using Excel
9. Calculating and displaying correlation statistics

	LECTURE	PRACTICAL	TOTAL
	0	60	60

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

YCA201 ADVANCED OPERATING SYSTEMS CONCEPTS

Course Outcomes:

CO1	C	Understand	***Explain*** the operating system functions
CO2	C	Understand	***Implement*** the process and various process scheduling algorithms
CO3	C	Knowledge	***Outline*** process cooperation and inter process communication
CO4	C	Understand	***Describe*** various memory management concepts
CO5	C	Understand	***Implement*** and ***understand*** the file organization

COURSE CODE	COURSE NAME	L	T	P	C
YCA201	ADVANCED OPERATING SYSTEMS CONCEPTS	4	1	0	4
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	C++ concepts, Windows Programming	4	1	0	5
UNIT I OVERVIEW OF OPERATING SYSTEMS					15
Functionalities and objectives of operating Systems- processor register- instruction execution- interrupts- types of interrupts.					
UNIT II PROCESS MANAGEMENT					15

Process concepts: process states- process control block- process and threads- processor scheduling- scheduling algorithms.	
UNIT III PRINCIPLES OF CONCURRENCY	**15**
Critical Sections - Mutual Exclusion - Process Cooperation- Inter Process Communication- Deadlock Prevention- Detection- Avoidance- Semaphores- Monitors-Message Passing.	
UNIT IV MEMORY MANAGEMENT	**15**
Virtual Memory Concepts- Paging and Segmentation- Address Mapping- Virtual Storage Management- Page Replacement Strategies.	
UNIT V FILE ORGANIZATION	**15**
Blocking and buffering, file descriptor- file and directory structures- I/O devices- disk scheduling.	

	LECTURE	TUTORIAL	PRACTICALS	TOTAL
	60	**15**	**-**	**75**

TEXT

1. William Stallings, Operating Systems , Prentice Hall of India (P) Ltd, 7th edition-2012.

2.AbrahamSilberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, Sixth edition. Addison-Wesley (2003).

REFERENCES

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

E REFERENCES

4. http://www.nptel.ac.in/courses/106108101/
5. http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html
6. http://www.nptel.ac.in/downloads/106108101/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCA202 - SOFTWARE ENGINEERING

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define lifecycle models.
CO2	C	Understand	***Understand*** and analyse the software inspections
CO3	C	Knowledge	***Describe*** and ***apply*** various software tools
CO4	C	Understand	***Describe*** and ***solve***issues in modern GUI
CO5	C	Understand	***Understand*** CASE tools and Software configuration management.

Course Code	Course Name	L	T	P	C
YCA202	Software Engineering	4	1	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	1	0	5

UNIT- I: Software life cycle — **15**

Models: Waterfall, Spiral - Prototyping Fourth generation techniques - SW Process - Software requirements specification (SRS)Fact-Finding Techniques - Characteristics of a good SRS: Unambiguous. Complete - Verifiable - Consistent - Modifiable - Traceable and usable during the operation and Maintenance phase - Prototype outline for SRS.

UNIT- II: Software Inspection — **15**

Communication Skills for the System Analyst - Review/Inspection Procedure: Document. Composition of the inspection team - check list - reading by the inspectors - Recording of the defects and action recommended - Students should practice inspecting small requirement specifications for good characteristics.

UNIT- III: System Analysis and SW Design — **15**

SA tools & Techniques - DFD - Entity Relationship Diagrams - Project Dictionary - System Design Tools and Techniques - Prototyping - Structured Programming.

UNIT- IV: User Interface Design and User Manual — **15**

Elements of good design - Design issues - Features of a modern GUI - Menus - scrolling - windows - Icons - Panels - Error messages, etc.

User Profile - Contents of an User Manual: Student is urged to install and use a software using its user manual and report the strengths and weaknesses of that user manual.

UNIT- V: Software Configuration Management and CASE — **15**

Software Configuration Management

Base Line - SCM process - Version Control - Change Management.

Computer Aided Software Engineering

CASE - Tools for Project management Support - Analysis & design - Programming - Prototyping - Maintenance - Future of CASE.

	LECTURE	TUTORIAL	TOTAL
	60	15	75

TEXT

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
3. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
4. Ian Sommerville, Software Engineering, Addison Wesley.
5. KassemSaleh,"Software Engineering", Cengage Learning.
6. Pfleeger, Software Engineering, Macmillan Publication

REFERENCES

1.Beizer, B., ''Software Testing Techniques", Second Edition. Van Nostrand Reinhold. New York. 1990.
2.IEEE Guide to Software Requirements Specifications, Std 830-1984. In" IEEE Standards Collection. 1993. Available from IEEE Standards Board, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. NJ, USA.
3.IEEE Standard for Software User Documentation, Std 1063-1987.
4.Pressman, R.S., ''Software engineering" A Practitioner's Approach", Third Edition, McGraw Hill. International Edition, 1992.
5.Whitten, Bentley and Barlow, "System Analysis anc' Design Methods", Second Edition, Galgotia Publications, 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	2	2	1	1	1	2	2
CO 2	3	3	3	2	2	1	1	1	2	2
CO 3	3	3	3	2	2	1	1	1	2	2
CO 4	3	3	3	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	14	14	10	10	5	5	5	10	10
Course	3	3	3	2	2	1	1	1	2	2

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

YCA203 ADVANCED DATA STRUCTURES

Course Outcomes:

CO1	C	Understand	***Illustrate*** the classification of Linear Data Structures.
CO2	C	Understand	***Explain*** the functions of Non Linear Data Structures
CO3	C	Understand	***Describe*** the operations of Advanced Data Structures
CO4	C	Knowledge	***Explain*** the various algorithms of Data Structures
CO5	C	Understand	***Describe*** the concepts and procedures sorting.

COURSE CODE	COURSE NAME	L	T	P	C
YCA203	Advanced Data Structures	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	C Programming	4	0	0	4

UNIT- I: LINEAR DATA STRUCTURES	**12**
Linear data Structures – Arrays, Records, Linked Lists – Singly, Doubly, Circular linked lists - Stack: Definition and examples, Representing Stacks - Queues: Definition and examples, priority queue, Dequeue, IRD, ORD – Applications of Stack, Queue and Linked Lists- Hashing	
UNIT –II: NON-LINEAR DATA STRUCTURES	**12**
Non-Linear data Structures - Binary Trees – Binary Tree Representations – node representation, internal and external nodes, implicit array representation - Operations on binary trees – Binary tree Traversals – Binary search trees- insertion, deletion, find. Graphs – Representation – Linked representation of Graphs – Graph Traversals.	
UNIT- III: ADVANCED CONCEPTS	**12**
Advanced data structures –Data structures for disjoint sets- AVL trees - Red-black trees – insertion and deletion – B-trees – Definition, insertion, deletion – Splay tree, Binomial heaps – operations.	
UNIT- IV: ALGORITHMS `	**12**
Single source shortest path algorithms – Bellman-Ford algorithm and Dijkstra's algorithm-Transitive closure -Topological sort – Trie Structures.	
UNIT- V: SORTING TECHNIQUES	**12**
Basic sorting techniques – selection sort, bubble sort, insertion sort - Merging and merge sort – Basic Search Techniques – linear search and binary search – recursive and non-recursive algorithms.	

	LECTURE	TUTORIAL	PRACTICALS	TOTAL
	60	0	0	60

TEXT

3. A.K. Sharma, "Data Structures using C", Pearson Education, 2013

4. Robert L. Kruse"Data Structures and Program Design in C, Pearson Education, 2013
5. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C.Stein, “Introduction to Algorithms”, 3rd Edition, MIT Press, 2009.
6. S. Lipschutz and G.A.V. Pai, “Data Structures”, Tata McGraw-Hill, 2010.

REFERENCES

4. Robert L Kruse: Data Structures and program designing using C, 2013.
5. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005
6. M.A.Weiss, “Data Structures and Problem Solving using Java”, 4th Edition, Addison Wesley, 2009.
7. D. Samanta, “Classic Data Structures”, 2nd Edition, PHI, 2009.
8. P. Brass, “Advanced Data Structures”, Cambridge University Press, 2008

E REFERENCES

3. NPTEL, Data structures and algorithm ,Prof. Hema A Murthy,IITMadras,Prof. Shankar Balachandran,IITMadras,Dr. N S. Narayanaswamy,IIT Madras
4. NPTEL, Data structures and algorithm ,Prof. Naveen Garg,IIT Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 8	PSO 9
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	3	2
CO 5	3	2	2	2	2	1	2	2	3	2
Total	15	13	10	10	10	5	10	10	15	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCA205 – ADVANCED OPERATING SYSTEM CONCEPTS LAB

Course Outcomes:

CO1	P	Guided Response	***Practice** the basic*scheduling algorithms
CO2	A	Apply	***Understand*** and apply algorithms to avoid dead lock
CO3	P	Guided Response	***Practice the*** various page replacement algorithms
CO4	A	Apply	***Apply***the algorithms for optimal page replacement
CO5	A	Apply	***Apply*** the linear, non-linear and sorting algorithms

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA205	**Advanced Operating System Concepts Lab**	**0**	**0**	**4**	**2**
C:P:A = 0:1:1		**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**
					60

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
7. Simulate FIFO Page Replacement Algorithms
8. Simulate LRU Page Replacement Algorithms
9. Simulate Optimal Page Replacement Algorithms
10. Implement linear and nonlinear data structures to solve real-time problems
11. Perform searching and sorting techniques of data structures to different application domains

LECTURE	**PRACTICAL**	**TOTAL**
0	**60**	**60**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

YCA206- CASE TOOLS LAB

Course Outcomes:

CO1	P	Guided Response	***Manipulate*** various methods to define CASE tools
CO2	P	Set	***Developing*** Relational databases
CO3	P	Guided Response	***Describe*** and ***implement*** various Application development tools
CO4	P	Set	***Describe*** and ***solve*** problems in developing application software
CO5	P	Guided Response	***Developing***Management tools

Course Code	Course Name	L	T	P	C
YCA206	Case Tools Lab	0	0	4	2
C:P:A = 0:2:0					
		L	T	P	H
		0	0	4	4
					60

The lab sessions will have experiments on the following:

1. Use of diagramming tools for system analysis, such as Turbo analyst, for preparing Data Flow diagrams and E-R diagrams.
2. Use of tools for relational database design such as relational Designer.
3. Identify Use Cases and develop the Use Case model.
4. Identify the conceptual classes and develop a domain model with UML Class diagram
5. Draw relevant state charts and activity diagrams.
6. Use of toots such as Power Builder, Delphi, Magic etc. in developing application software including interactive data-entry screens,
7. Transaction processing
8. Report Generations, etc.
9. Use of tools for managing the process of software development such as Source Code Control System (SCCS).
10. Revision Control System (RCS), Make etc.

References

Products manuals from concerned vendors

Keminghan, B.W., Pike, R., '6'fbe Unix Programming Environment", Prentice Hall of India, New Delhi, 1984.

	LECTURE	PRACTICAL	TOTAL
	0	60	60

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCA301-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Course Outcomes:

CO1 C Knowledge ***Describe*** various methods to define AI techniques

CO2 C Understand ***Understand*** and apply set theory and Relations

CO3 C Knowledge ***Describe*** and ***apply*** various counting and Predicate Logic

CO4 C Understand ***Describe*** and ***solve*** problems in Probabilistic reasoning

CO5 C Understand ***Understand***Concept of learning the expert systems

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA301	**Artificial Intelligence and Machine Learning**	**4**	**0**	**0**	**4**
C:P:A = 4:0:0					
		L	**T**	**P**	**H**
		4	**0**	**0**	**4**
UNIT –I: AI Techniques					**12**
AI techniques-search knowledge, abstraction- natural language processing- vision and speech processing- Games-theorem proving- robotics - expert systems.					
UNIT -II : State Space Search					**12**
State space search: Production systems- Search space control: Depth first, breadth first search, heuristic search - Hill climbing - best first search - branch and bound.					
UNIT- III: Predicate Logic					**12**

Minimax search: Alpha-Beta cut offs- Predicate Logic :Skolemizing queries - Unification. Modus pone - Resolution - dependency directed backtracking

UNIT- IV: Backtracking | **12**

Rule Based Systems-Forward reasoning-Conflict resolution-Backward reasoning-
Use of no backtrack-Structured Knowledge Representations- Semantic Net-slots, exceptions and defaults Frames- Probabilistic reasoning-Use of certainty factors-Fuzzy logic.

UNIT- V: Expert Systems | **12**

Concept of learning-learning automation-genetic algorithm- learning by induction-neural netsback propagation-Need and justification for expert systems- Knowledge acquisition-Case studies: MYCIN, RI.

	LECTURE	TUTORIAL	TOTAL
	60	0	60

TEXT

1. Stuart J.Russell and Peter Norvig., "Artificial Intelligence- A Modern Approach", Pearson-3rd edition, 2010.

REFERENCES

1. Nilsson, N.J., "Principles of AP', Narosa Publishing House, 1990.
2. Patterson, D. W., "Introduction to AI and Expert Systems", Prentice Hall of India, 1992.
3. Peter Jackson, "Introduction to Expert Systems", Addison Wesley Publishing Company, M.A., 1992
4. Rich, E., and Knight, K., "Artificial Intelligence", Tata McGraw Hill (2nd Edition), 1992.
5. Schalk off, R.J., "Artificial Intelligence • An Engineering Approach", McGraw Hill International Edition, Singapore, 1992.
6. Sasikumar, M., Ramani, S., "Rule Based Expert System", Narosa Publishing House,1994.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCA302-GRAPHICS AND MULTIMEDIA

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define line-drawing algorithms
CO2	C	Understand	***Understand*** and apply 2d and 3d transformations
CO3	C	Knowledge	***Describe*** and ***apply*** various types multimedia applications
CO4	C	Understand	***Describe*** and ***solve*** problems in development tools
CO5	C	Understand	***Understand***hypermedia

COURSE CODE	COURSE NAME	L	T	P	C
YCA302	Graphics and Multimedia	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

UNIT -I :OUTPUT PRIMITIVES	**09**
Points and lines – Line-drawing algorithms – DDA algorithm – Bresenham's line algorithm – Attributes of output primitives: Line attributes – Area-fill attributes – Character attributes – Bundled attributes	
UNIT- II: 2D AND 3D TRANSFORMATIONS	**09**
Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Three-Dimensional object representations − Three-Dimensional geometric and modeling transformations − Three-Dimensional viewing − Hidden surface elimination − Color models – Virtual reality – Animation	
UNIT- III: MUTLIMEDIA	**09**
Multimedia basics − Multimedia applications − Multimedia system architecture − Evolving technologies for multimedia − Defining objects for multimedia systems − Multimedia data interface standards − Multimedia databases	
UNIT- IV: MULTIMEDIA	**09**
Technology: Development Tools – Image – Audio – Video- Compression and decompression − Data and file format standards − Multimedia I/O technologies − Digital voice and audio − Video image and animation − Full motion video − Storage and retrieval technologies	
UNIT- V: HYPERMEDIA	**09**
Multimedia authoring and user interface − Hypermedia messaging − Mobile messaging −	

Hypermedia message component − Creating hypermedia message − Integrated multimedia message standards − Integrated document management − Distributed multimedia systems

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT

1. Donald Hearn and M.Pauline Baker, Computer Graphics in C Version, Fifth Edition, Pearson Education, 2015.
2. Andleigh, P. K and KiranThakrar , Multimedia Systems and Design, PHI, 2003.
3. Judith Jeffcoate , Multimedia in Practice: Technology and Practice., Pearson Education, 2014

REFERENCES

1. William M. Neuman, Robert R. Sprout, Principles of interactive Computer Graphics, McGraw Hill International Edition.
2. Buford J. F Koegel, Multimedia Systems, Twelfth Indian Reprint, Pearson Education

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	3	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	15	14	11	11	11	5	10	10	13	13
Course	3	3	3	3	3	1	1	1	3	3

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

YCA303- OPTIMIZATION TECHNIQUES

Course Outcomes:

CO1 C Knowledge ***Describe*** various methods to define simplex method

CO2 C Understand ***Understand*** and apply branch and bound method.

CO3 C Knowledge ***Describe*** and ***apply*** various queuing theory

CO4 C Understand ***Describe*** and ***solve*** problems in inventory theory

CO5 C Understand ***Understand***PERT and CPMpath.

COURSE CODE	COURSE NAME	L	T	P	C
YCA303	**Optimization Techniques Linear Programming**	**4**	**0**	**0**	**4**
C:P:A = 4:0:0					
		L	**T**	**P**	**H**
		4	**0**	**0**	**4**

UNIT- I: Introduction to Optimization Techniques **12**

Graphical method for two dimensional problems - Central problem of linear programming various definitions - statements of basic theorems and properties - Phase I and Phase II of the simplex method - revised simplex method - primal and dual - dual simplex method.

UNIT- II: Integer Programming **12**

Sensitivity analysis transportation problem and its solution - assignment problem and its solution by Hungarian method- Gomorra cutting plane methods - Branch and Bound method

UNIT- III: Queuing Theory **12**

Characteristics of queuing systems - steady state Mimi, MlMit/K and MIMIC queueing models- Replacement of items that deteriorate - Replacement of items that fail Group replacement and individual replacement.

UNIT- IV: Inventory Theory **12**

Costs involved in inventory problems - single item deterministic models-economic lot size models without shortages and with shortages having production rate infinite and finite.

UNIT- V: PERT and CPM **12**

Arrow networks - time estimates- earliest expected time, latest allowable occurrence time and slack - critical path - probability of meeting scheduled date of completion of project- calculations on CPM network - various floats for activities - critical path - updating project - operation time cost trade off curve - project time cost trade off curve - selection of schedule based on cost analysis.

	LECTURE	TUTORIAL	TOTAL
	60	**0**	**60**

TEXT

1. HamdyA.TAHA.,"Operations research- An Introduction", 8th edition, Pearson Education,Inc,2007.

REFERENCES

1. Karnbo, N.S., "Mathematical Programming Techniques", McGraw Hill, New York. 1985.
2. KantiSwarup, Gupta, P.K., and Man Mohan, "Operations Research", Sultan Chand &

Sons-New Delhi. 1990.

3. Mital K. V., "Optimization Methods In Operations Research and System Analysis", New Age International (P) Ltd., New Delhi, 1992.
4. Saffer, L.R., Fitter J.B., and MeyerW.L., "The Critical Path Method". McGraw Hill. New York. 1990.
5. Taha, H.A., "Operations research- An Introduction", McMillan Publishing co .• New York, 1986.
6. Gillet, B.E., "Introduction to Operations Research : A Computer Oriented Algorithmic Approach". Tata McGraw Hill, New York, 1990.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	2	2	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
Total	13	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCA304- ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB

Course Outcomes:

CO 1	P	Guided Response	***Manipulate*** various methods to define AI techniques
CO 2	P	Set	***Starts*** and apply set theory and Relations
CO 3	P	Guided Response	***Develop*** and ***implement***various counting and Predicate Logic
CO 4	P	Guided Response	***Develop*** and ***solve***problems in Probabilistic reasoning
CO 5	P	Set	***Build***Concept of learning the expert systems

COURSE CODE	COURSE NAME	L	T	P	C
YCA304	Artificial Intelligence and Machine Learning Lab	0	0	3	2

C:P:A = 0:2:0					
		L	**T**	**P**	**H**
		0	**0**	**0**	**3**
					45

1. Switches, Lights, and Multiplexers
2. Numbers and Displays
3. Latches, Flip-flops, and Registers
4. Counters
5. Timers and Real-Time Clock
6. Adders, Subtractors, and Multipliers
7. Finite State Machines
8. Memory Blocks
9. A Simple Processor
10. An Enhanced Processor

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

YCA305-OPTIMIZATION TECHNIQUES LAB

Course Outcomes:

CO1	P	Guided Response	***Manipulate*** various methods to define simplex method
CO2	P	Set	***Starts*** and apply branch and bound method.
CO3	P	Guided Response	***Develop*** and ***implement***various queuing theory
CO4	P	Guided Response	***Develop*** and ***solve***problems in inventory theory

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA305	**Optimization Techniques Lab**	**0**	**0**	**4**	**2**
C:P:A = 0:2:0					
		L	**T**	**P**	**H**
		0	**0**	**4**	**4**
					60

To develop computer programs for the following and to test with suitable numerical examples

1. Graphical method to solve two dimensional Linear Programming Problem.
2. Revised Simplex method to solve n-dimensional Linear Programming Problem
3. Dual Simplex method to solve n-dimensional Linear Programming Problem.
4. Solution of Transportation problem.
5. Gomory cutting plane methods for Integer Programming Problems
6. Branch and Bound method to solve Integer Programming Problem.
7. M/M/1/N AND M/M/C queuing problems.
8. Single item deterministic inventory model problems with/without shortage and finite/infinite production rate.
9. To draw the PERT/CPM networks.
10. Calculations of PERT analysis
11. Calculation of CPM analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2

CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

COURSECODE	COURSE NAME	L	T	P	C
YCA306	Industrials Lectures	0	0	2	2
C:P:A = 0:2:0					
		L	T	P	H
		0	0	2	2

CO1	P	Guided Response	Identifying the Recent Technologies
CO2	P	Guided Response	Preparing the content/Arranging the Seminar
CO3	P	Guided Response	Attending the Lectures
CO4	P	Guided Response	Implementing the Lectures
CO5	P	Guided Response	Answer the Question

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	3	3
CO 2	2	2	2	2	2	2	2	2	3	3
CO 3	2	2	2	2	2	2	2	2	3	3
CO 4	2	2	2	2	2	2	2	2	3	3
CO 5	2	2	2	2	2	2	2	2	3	3
Total	10	10	10	10	10	10	10	10	15	15
Course	3	2	2	2	2	2	2	2	3	3

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

COURSECODE	COURSE NAME	L	T	P	C
YCA307	Mini Project	0	0	3	2
C:P:A = 0:2:0					
		L	T	P	H
		0	0	3	3

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	PO8	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	3	3
CO 2	2	2	2	2	2	2	2	2	3	3
CO 3	2	2	2	2	2	2	2	2	3	3
CO 4	2	2	2	2	2	2	2	2	3	3
CO 5	2	2	2	2	2	2	2	2	3	3
Total	10	10	10	10	10	10	10	10	15	15
Course	3	2	2	2	2	2	2	2	3	3

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

COURSECODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA401	Research Methodology(Paper Publications)	0	0	3	3
C:P:A = 0:3:0					
		L	**T**	**P**	**H**
		0	0	3	3

CO1	P	Guided Response	Identifying the Topic
CO2	P	Guided Response	Preparing the content/Arranging the Seminar
CO3	P	Guided Response	Presenting the content
CO4	P	Guided Response	Addressing the Audience
CO5	P	Guided Response	Answer the Question

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	3	3
CO 2	2	2	2	2	2	2	2	2	3	3
CO 3	2	2	2	2	2	2	2	2	3	3
CO 4	2	2	2	2	2	2	2	2	3	3
CO 5	2	2	2	2	2	2	2	2	3	3
Total	10	10	10	10	10	10	10	10	15	15
Course	3	2	2	2	2	2	2	2	3	3

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

COURSECODE	COURSE NAME	L	T	P	C
YCA402	Project Work	0	0	6	12
C:P:A = 0:3:2					
		L	T	P	H
		0	0	6	6

CO1 P Guided Response Practice the Requirements Analysis
CO2 P Guided Response Develop the Design of the project
CO3 P Guided Response Create the Coding
CO4 P Guided Response Plan for Testing
CO5 P Guided Response Solve the problem and Write Conclusion

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	3	3
CO 2	2	2	2	2	2	2	2	2	3	3
CO 3	2	2	2	2	2	2	2	2	3	3
CO 4	2	2	2	2	2	2	2	2	3	3
CO 5	2	2	2	2	2	2	2	2	3	3
Total	10	10	10	10	10	10	10	10	15	15
Course	3	2	2	2	2	2	2	2	3	3

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

YCAEE1 DATA MINING AND DATA WAREHOUSING

Course Outcomes:

CO1 C Understand ***Explain*** the concepts of data mining
CO2 C Understand ***Describe*** and ***implement*** the concept of association rule mining
CO3 C Understand ***Describe*** and ***implement*** the concept of classification and clustering the datasets .
CO4 C Understand ***Describe*** and ***implement*** various types data warehouse tools
CO5 C Understand ***illustrate*** the different types of mining concepts and its applications

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE1	DATA MINING AND DATA WAREHOUSING	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	0	0	4
UNIT I FUNDAMENTALS				12	

Fundamentals of Statistics – Databases – Data Mining Functionalities – Steps in Data Mining Process– Architecture of a typical Data Mining Systems – Classification of Data Mining Systems –Overview of Data Mining Techniques-Major issues in data mining.

UNIT IIDATA PREPROCESSING AND ASSOCIATION RULES	**12**

Data Pre-processing: Data Cleaning– Data Integration– Data Transformation – Data Reduction– Concept Hierarchies – Concept Description- Data Generalization - Data Summarization- Data Characterization– Mining Association Rules in Large Databases.

UNIT IIIPREDICTIVE MODELING	**12**

Classification and Prediction Issues Regarding Classification and Prediction–Classification by Decision Tree Induction – Bayesian Classification – Other Classification Methods – Prediction – Clusters Analysis Types of Data in Cluster Analysis – Categorization of Major Clustering Methods Partitioning Methods – Hierarchical Methods

UNIT IVDATA WAREHOUSING	**12**

Data Warehousing Components – Multi Dimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – Mapping the Data Warehouse to Multiprocessor Architecture – OLAP – Need – Categorization of OLAP Tools.

UNIT V APPLICATIONS	**12**

Applications of Data Mining – Social Impacts of Data Mining – Tools – An Introduction to DB Miner – Case Studies – Mining WWW – Mining Text Database – Mining Spatial Databases.

	LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
	60	**-**	**-**	**60**

TEXT

1. Jiawei Han and MichelineKamber, Data Mining Concepts and Techniques, Morgan Kaufmann Publishers, 2002.

REFERENCES

1. Alex Berson and Stephen J. Smith, Data Warehousing- Data Mining & OLAP, TMH, 2011.
2. UsamaM.Fayyadet. Al., Advances in Knowledge Discovery and Data Mining, The M.I.T Press, 2009.
3. Ralph Kimball, The Data Warehouse Life Cycle Toolkit, John Wiley & Sons Inc., 2008.

E REFERENCES

1. https://www.tacoma.uw.edu/sites/default/files/sections/InstituteTechnology/TCSS555_Datamining.pdf
2. *http://www.kdnuggets.com/data_mining_course/syllabus.html*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	0	1	0	2	0	0	1	3
CO 2	3	2	1	1	0	0	2	0	1	2
CO 3	2	2	1	2	0	0	2	0	0	2
CO 4	2	0	2	1	0	0	2	0	2	2
CO 5	2	0	2	2	0	0	0	0	2	2
Total	12	6	6	7	0	2	6	0	6	11
Course	3	2	2	2	0	1	2	0	2	3

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

YCABM4- INVESTMENT TECHNOLOGY

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define Source of ***investment information***
CO2	C	Understand	***Understand*** and apply set ***Interest Rates***
CO3	C	Knowledge	***Describe*** and ***apply*** various ***Shares and Valuation***
CO4	C	Understand	***Describe*** and ***solve*** problems in ***Portfolio Theory***
CO5	C	Understand	***Understand***Concept of learning the ***Mutual Funds***

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCABM4	**Investment Technology**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT- I:Investment Information-Introduction	**9**
Source of investment information -Valuation of debt securities: Debt prices and interest rate risk-Default risk and purchasing power risk.	
UNIT- II:Interest Rates	**9**
Market interest rates - term structure of interest rates- Valuation of warrants-convertibles-Option pricing models.	
UNIT- III: Shares and Valuation	**9**
Valuation of equity shares: Dividends and valuation: MMS arguments, fundamental analysis-Earning multipliers-Timing of purchase -sale of equity shares-Estimating earnings and risk.	
UNIT- IV: Portfolio Theory	**9**
Portfolio theory- Efficient investments –diversification-Markowitz graphical portfolio analysis-Capital market theory- Portfolio performance evaluation- sharpe.	
UNIT- V: Mutual Funds	**9**
Treynor- Jenson measures- Mutual funds - kinds and evaluation-Behaviour of share prices - technical analysis-The efficient markets-Hypothesis - random walk and Martingale methods.	

LECTURE	**TUTORIAL**	**TOTAL**
45	**0**	**45**

TEXT

1. Clark N..et. al. "Financial Management: A Capital Market Approach". Helbrook, 1976

REFERENCES

2. Sharpe. W.F., "Investments". Prentice Hall of India. New Delhi. 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	1	2	1	1	1	2	2
CO 2	2	2	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	2	1	1	2	1	1	1	2	2
Total	10	10	6	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

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

BSc Data Science

ACADEMIC YEAR 2022-2023

XDS103 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	Nil	**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(),fewind()-fgetc(), fputc(), fscanf()-program using files				
	LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
	60	**0**		**60**

TEXT

1. Programming in ANSI 8th Edition,935316513X · 9789353165130 By E Balagurusamy

© 2019 | Published: March 15, 2019

REFERENCES

5. YashwantKanetker, Let us C, BPB Publications.
6. 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.
7. Gottfried, Programming with C, Tata McGraw Hill.
8. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd Ed., PHI.

E REFERENCES

5. NPTEL, Introduction to C Programming, Prof.SatyadevNandakumar ,IIT, Computer Science and Engineering Kanpur.
6. 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

COURSE NAME			**MATHEMATICS FOR DATA SCIENCE -I**	**L**	**T**	**P**	**C**
COURSE CODE			**XDS104**	**4**	**1**	**0**	**5**
C	**P**	**A**		**L**	**T**	**P**	**H**
5	**0**	**0**		**4**	**1**	**0**	**5**
PREREQUISITE			Basics of sets, relations and functions				

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

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
CO 1	Utilize the concepts of elimination method to solve system of linear equations	Cognitive	Applying
CO 2	Apply Gram Schmidt orthonormalization process to construct an orthonormal set of vectors from the given linearly independent set of vectors	Cognitive	Applying
CO 3	Utilize the concepts of orthogonal transformation to diagonalize a given matrix	Cognitive	Applying

CO 4	Construct SV decomposition for a given set of vectors	Cognitive	Applying
CO 5	Utilize the concepts of iterative methods for solving linear systems	Cognitive	Applying

UNIT 1	**Introduction to Vectors and Solving Linear Equations**	**15 hours**

Introduction to Vectors and Matrices: Length and Dot Products.
Solving Linear Equations: Linear Equations – The Idea of Elimination – Elimination Using Matrices – Rules for Matrix Operations – Inverse Matrices – Elimination = Factorization: A = LU – Transposes and Permutations

UNIT 2	**Vector Spaces and Orthogonality**	**15 hours**

Vector Spaces and Subspaces: Spaces of Vectors – The Null space of A: Solving Ax = 0 – The Rank and the Row Reduced Form – The complete solution to Ax=b – Independence, Basis, and Dimensions – Dimensions of the four Subspaces.
Orthogonality: Orthogonality of the Four Subspaces – Projections – Least Squares Approximations – Orthogonal Bases and Gram – Schmidt.

UNIT 3	**Determinants and Eigen values and Eigen vectors**	**15 hours**

Determinants: The Properties of Determinants – Permutations and Cofactors – Cramer‟s Rule, Inverse, and Volumes.
Eigen values and Eigenvectors: Introduction to Eigen values – Diagonalizing Matrix – System of Differential Equations – Symmetric Matrices – Positive Definite Matrices.

UNIT 4	**The Singular Value Decomposition (SVD) and Linear Transformations**	**15 hours**

Singular value Decomposition: Bases and Matrices in the SVD - Principal Component Analysis - The Geometry of the SVD.
Linear Transformations: The Idea of a Linear Transformation – The Matrix of a Linear Transformation – The Search for a Good Basis

UNIT 5	**Complex Vectors, Complex Matrices and Numerical Linear Algebra**	**15 hours**

Complex Vectors and Complex Matrices: Complex Numbers – Hermitian and Unitary Matrices –The Fast Fourier Transform – Applications.
Numerical Linear Algebra: Gaussian Elimination in Practice -Norms and Condition Numbers - Iterative Methods and Preconditioners.

LECTURE	**60**	**TUTORIAL**	**15**	**PRACTICAL**	**0**	**TOTAL**	**75**

TEXT BOOK

1. Gilbert Strang (2016). Introduction to Linear Algebra, 5th Edition. Wellesley – Cambridge Press

UNIT – I Chapter 1& 2
UNIT – II Chapter 3 & 4
UNIT – III Chapter 5 & 6
UNIT – IV Chapter 7 & 8
UNIT – V Chapter 9 & 11

REFERENCES

1. S.Lang (1997). Introduction to Linear Algebra. Second Edition. Springer.
2. Gilbert Strang (2006). Linear Algebra and Its Applications. Fourth Edition. Cengage Learning.
3. David C. Lay, Steven R. Lay, and Judi J. McDonald (2014). Linear Algebra and Its Applications. 5th Edition. Pearson.

	PO 1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO 1	2	3	1	1	1	0	1	2	3
CO 2	2	3	1	1	1	0	1	2	3

CO 3	1	3	1	1	1	0	1	2	3
CO 4	1	3	1	1	1	0	1	2	3
CO 5	2	3	1	1	1	0	1	2	3
TOTAL	**8**	**15**	**5**	**5**	**5**	**0**	**5**	**10**	**15**
SCALED VALUE	2	3	1	1	1	0	1	2	**3**

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

XDS105 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	**Summarizes** memory organization and management

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
XDS105	**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**	**TOTAL**
60	**0**	**60**

6. M.Morris Mano “Computer System Architecture”, Pearson Education, Third Edition,2014.

7. M.Morris Mano "Digital Logic and Computer Design", Pearson Education, 2010.
8. William Stallings, "Computer Organization and Architecture", Tenth Edition, Pearson Education, 2015.

REFERENCES

3. 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
4. David A. Patterson, John L.Hennessy, "Computer Organization and Design", Fourth Edition, Morgan Kauffmann Publishers, 2011.

E REFERENCES

3. NPTEL, Computer Architecture, Prof. Anshul Kumar, Department of Computer Science &Engineering, IIT Delhi.
4. 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.
9. M.Morris Mano "Digital Logic and Computer Design", Pearson Education, 2010.
10. 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

XDS106 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

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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	Nil	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	PRACTICAL	TOTAL
	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	***Relate*** and ***Interpret*** the human ethics and human relationships	Cognitive	Remember, Understand
CO2	***Explain*** and ***Apply*** gender issues, equality and violence against women	Cognitive	Understand, Apply
CO3	***Classify*** and ***Develop*** the identify of women issues and challenges	Cognitive & Affective	Analyze Receive
CO4	***Classify***and***Dissect*** human rights and report on violations.	Cognitive	Understand, Analyze
CO5	***List*** and **respond** 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 IIGENDER 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. Ambethkar, Thanthai Periyar and Phule to Women Empowerment.

UNIT IIIWOMEN 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

14. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
15. Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).
16. Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).
17. Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).
18. Kaushal, Rachna, Women and Human Rights in India (New Delhi: Kaveri Books, 2000)
19. Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights, 1998).
20. Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).
21. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
22. Veeramani, K. (ed) Periyar Feminism, (Periyar Maniammai University, Vallam, Thanjavur: 2010).
23. 10.Planning Commission report on Occupational Health and Safety http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p
24. Central Vigilance Commission (Gov. of India) website: http://cvc.nic.in/welcome.html.
25. Weblink of Transparency International: https://www.transparency.org/
26. Weblink Status report: https://www.hrw.org/world-report/2015/country-chapters/india

Table 1 : Mapping of COs with Pos

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
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

XDS203 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**
XDS203	**OBJECT ORIENTED PROGRAMMING WITH C++**	**4**	**0**	**0**	**4**
C:P:A =4:0:0					
		L	**T**	**P**	**H**
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

3. BjarneStroustrup, "The C++ Programming Language", Pearson Education, 2014.
4. Stanley B. Lippman, JoseeLajoieandBarbara E. Moo, "The C++ Primer", Addison Wesley, 2013, Fifth Edition.

REFERENCES

2. 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

COURSE CODE			COURSE NAME	L	T	P	C
XDS204			MATHEMATICS FOR DATA SCIENCE -II	4	1	0	5
C	P	A					
5	0	0		L	T	P	H
				4	1	0	5

PREREQUISITE: Algebra

COURSE OUTCOMES:

Course outcomes:	Domain	Level
CO1:Explainthediscrete, continuousrandom *variable, moments,*expectation, moment*generating function and characteristic function with simple problems.*	Cognitive	Understanding
CO2: Define the probability mass function and probability density of discrete and continuous distributions and to find the mean and variance of them.	Cognitive	Understanding
CO3: Find thecentral tendency and to **identify** correlation coefficient and regression analysis for a given data.	Cognitive	Applying

CO4: Apply procedure for a population mean when the sample size is large to test the single and difference of proportions, means and standard deviation.	Cognitive	Applying
CO5:Utilizet test to find significance of the means, F test to find significance of variance and Chi square test to test the goodness of fit and independent attributes.	Cognitive	Applying

UNIT I BASIC PROBABILITY	**15**
Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, and probability mass/density functions. Mathematical expectation, moments, moment generating function, characteristic function.	
UNIT IIPROBABILITYDISTRIBUTIONS	**15**
Discrete Distributions: Binomial, Poisson, - ContinuousDistributions: Uniform, Normal, and Exponential.	
UNIT III BASIC STATISTICS	**15**
Measures of Central tendency-Correlation and Regression – Rank correlation.	
UNIT IV APPLIED STATISTICS-LARGE SAMPLES	**15**
Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.	
UNIT V APPLIED STATISTICS - SMALL SAMPLES	**15**
Test for single mean, difference of means and test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.	

LECTURE	TUTORIAL	TOTAL
60	**15**	**75**

TEXTBOOK

1. S.C.Gupta and Kapoor, "Fundamentals of Mathematical Statistics", tenth revised edition Sultan Chand and Sons, New Delhi, 2002.

REFERENCES

1. Irwin Miller and Marylees Miller, John E. Freund, "Mathematical Statistics with Application", 7th Ed., Pearson Education, Asia, 2006.
2. Sheldon Ross, "Introduction to Probability Model", 9th Ed., Academic Press, Indian Reprint, 2007.

XDS205 FUNDAMENTALS OF DATA SCIENCE

Course Outcomes:

CO1	C	Understand	**Infers**the basic concepts of data science
CO2	C	Understand	**Defines** some techniques of data science
CO3	C	Analyze	**Comparative** studies about algorithm
CO4	C	Analyze	**Analyze** study about data science
CO5	C	Understand	**Distinguishes** about tools of Visualization

COURSE CODE	COURSE NAME	L	T	P	C
XDS205	**FUNDAMENTALS OF DATA SCIENCE**	**4**	**0**	**0**	**4**
C:P: A = 4:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Nil	**4**	**0**	**0**	**4**

UNIT-I : INTRODUCTION	**12**
Introduction – What is Data Science? -Big Data and Data Science Hype- Datafication-Role of Data Scientist- Current landscape of perspectives, Statistical Inference - Populations and	**12**

Samples, Statistical modeling, Probability distributions, Modeling - Exploratory Data Analysis – Philosophy Data Science Process - Case Study: RealDirect.	
UNIT-II : Algorithms: Linear Regression, k-NN, k-means, Spam Filters, Naive Bayes, Wrangling -Logistic Regression: Classifiers, Case Study: M6D Logistic Regression.	
UNIT-III: EXPLORATORY DATA ANALYTICS	**12**
Feature Generation Brainstorming, Role of domain expertise, and Place for imagination – Feature Selection: Filters, Wrappers, Decision Trees, Random Forests.	
UNIT- IV: MODEL DEVELOPMENT	**12**
Recommendation Engines: Nearest Neighbors - Dimensionality Problem-Singular Value Decomposition, Principal Component Analysis - Social Network Analysis.	
UNIT- V: VISUALIZATION	**12**
Data Visualization: Basic principles, ideas and tools for data visualization, Sample projects – Data Engineering algorithms - Data Scientists and Ethics.	

LECTURE	TUTORIAL	PRACTICALS	TOTAL
60	0	0	60

TEXT

3. Rachel Schutt and Cathy O'Neil , “Doing Data Science, Straight Talk From The Frontline”, O’Reilly
4. Jure Leskovek, AnandRajaraman and Jerey D. Ullman, “Mining of Massive Datasets”, 2nd Edition,
5. Cambridge University Press. 2014.
6. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective, MIT Press, Cambridge,2013.
7. Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about
8. Data Mining and Data-analytic Thinking, O’Reilly Media, 2013..

REFERENCES

1.David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013
2.Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.

Table 1 : Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
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- High relation 2- Medium relation 1– Low relation

XDS206 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
XDS206	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

7. A.K. Sharma, "Data Structures using C", Pearson Education, 2013
8. Robert L. Kruse"Data Structures and Program Design in C, Pearson Education, 2013

REFERENCES

9. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005
10. Aaron M. Tanenbaum, Moshe J. Augenstein and YedidyahLangsam, "Data structures using C and C++", Prentice Hall, 2012.
11. Michael T. Goodrich, Roberto Tamassia and David Mount, " Data Structures and Algorithms in C++", John Wiley, 2011.

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5. NPTEL, Data structures and algorithm ,Prof. Hema A Murthy,IITMadras,Prof. Shankar Balachandran,IITMadras,Dr. N S. Narayanaswamy,IIT Madras
6. 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

XDS207 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
XDS207	OBJECT ORIENTED PROGRAMMING WITH C++ LABORATORY	0	0	1	1
C:P:A =1:0:0					
		L	T	P	H
PREREQUISITE	C++ Programming	0	0	2	2

12. Implement Various Control Structures.
13. Demonstrate Inline Functions
14. Implement Structure & Unions
15. Implement Class and Subclass
16. Demonstrate Constructors & Destructors.
17. Programs to Implement Friend Function
18. Implement Multilevel Inheritance
19. Implement Multiple Inheritance with Access Specifiers
20. Implement Hierarchical inheritance

21. Programs to Overload Unary & Binary Operators
22. 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

XDS208 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
XDS208	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:

10. Create a Stack and do the following operations using array
11. (i)Push (ii) Pop (iii) Peep
12. Create a Queue and do the following operations using array(i)Add (ii) Remove
13. Implement the operations on singly linked list.
14. Implement the following operations on a binary search tree.
    a. (i) Insert a node (ii) Delete a node
15. Create a binary search tree and do the following traversals
    a. (i)In-order (ii) Pre order (iii) Post order
16. Sort the given list of numbers using insertion sort
17. Sort the given list of numbers using quick sort.
18. Perform the following operations in a given graph
    (i) Depth first search (ii) Breadth first search

	LECTURE	PRACTICAL	TUTORIAL	TOTAL
	0	15	0	15

	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	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Remember Understand
CO2	***Illustrate*** the significance of ecosystem, biodiversity and natural geobio chemical cycles for maintaining ecological balance.	Cognitive	Understand
CO3	***Identify*** the facts, consequences and apply the preventive measures of major pollutions and ***recognize*** and the disaster phenomenon.	Cognitive Affective	Apply Receiving
CO4	***Explain*** the socio-economic, policy dynamics and***practice*** the control measures of global issues for sustainable development.	Cognitive	Understand Analyse
CO5	***Recognize*** the impact of population and the concept of various welfare programs, and explain themodern 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**

Structure and function of an ecosystem – Producers, consumers and decomposers –Biogeochemical cycles- Food chains, Food webs, Structure and Function of the Forest ecosystem and Aquatic ecosystem– Introduction to Biodiversity- Endemic, Extinct and Endangered species- Conservation of Biodiversity: In-situ and Ex-situ conservation

UNIT – III ENVIRONMENTAL POLLUTION	**3+3**
Definition – Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards – Solid waste management: Causes, effects and control measures of industrial wastes – Role of an individual in prevention of pollution – Pollution case studies	
UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT	**3+3**
Rain water harvesting– Resettlement and Rehabilitation of people, Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and Holocaust – Environment Protection Act – Water Act – Wildlife Protection Act – Forest Conservation Act.	
UNIT –VHUMAN POPULATION AND THE ENVIRONMENT	**3+3**
Population growth, Variation among nations - Population explosion - Environment and Human health- HIV / AIDS – Role of Information Technology in Environment and human health – Case studies.	

	LECTURE	**TUTORIAL**	**TOTAL**
	30	**0**	**30**

TEXT BOOKS

7. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, (2000).
8. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, (2003).
9. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, (2003).
10. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, (2006).
11. Introduction to International disaster management, Butterworth Heinemann, (2006).
12. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, (2004).

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7. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, (2009).
8. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, (2001).
9. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, (2012).
10. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, (2003).
11. Sundar, Disaster Management, Sarup& Sons, New Delhi, (2007).
12. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, (2006).

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14. http://www.e-booksdirectory.com/details.php?ebook=10526
15. https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science
16. https://www.free-ebooks.net/ebook/What-is-Biodiversity
17. https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4
18. http://bookboon.com/en/pollution-prevention-and-control-ebook
19. http://www.e-booksdirectory.com/details.php?ebook=8557
20. http://www.e-booksdirectory.com/details.php?ebook=6804
21. http://bookboon.com/en/atmospheric-pollution-ebook
22. http://www.e-booksdirectory.com/details.php?ebook=3749
23. http://www.e-booksdirectory.com/details.php?ebook=2604
24. http://www.e-booksdirectory.com/details.php?ebook=2116

25. http://www.e-booksdirectory.com/details.php?ebook=1026
26. http://www.faadooengineers.com/threads/7894-Environmental-Science

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