



**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

- List of courses for the programmes in order of

S. No.	Programme Name
i.	Bachelor of Computer Applications (Full Time)
ii.	Master of Computer Applications(Full Time)

- Syllabus of the courses as per the list.

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

## 1. List of Courses

Course Code	Name of the Course	Year of introduction	Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development
<b>BCA</b>			
<b>2020-21 ACADEMIC YEAR (ODD and EVEN)</b>			
XGL101	Communication Skills in English	2018-2019	<b>Skill development</b> - Group Discussion , Spoken and Written communication
XGL102A / XGL102B	Ariviyal Tamil / Comprehensive English	2017-2018	<b>Skill development</b> - Group Discussion , Spoken and Written communication
XCA103	C Programming	2015-2016	<b>Employability:</b> Improving programming skill of students
XCA104	Algebra, Calculus and Analytical Geometry	2015-2016	<b>Skill development:</b> -Solving the real world problem by mathematically
XCA105	Computer Organization and Architecture	2015-2016	<b>Employability:</b> Improving programming skill of students
XUM106	Human Ethics, Values , Rights and Gender Equality	2014-2015	<b>Skill development:</b> -Solving the real world problem <b>by ethics</b>
XGL201	English for Effective Communication	2020-2021	<b>Skill development</b> - Group Discussion , Spoken and Written communication
XES202	Environmental Studies	2015-2016	<b>Skill development:</b> -Solving the real world problem <b>by understading environment</b>
XCA203	Object Oriented Programming with C++	2015-2016	<b>Employability:</b> Improving programming skill of students
XCA204	Discrete Mathematics	2015-2016	<b>Skill development:</b> -Solving the real world problem by mathematically
XCA205	Computer Networks	2018-2019	<b>Employability:</b> Improving programming skill of students
XCA206	Data Structures and Algorithms	2015-2016	<b>Employability:</b> Improving programming skill of students
XCA301	HTML and DHTML	2016-2017	<b>Employability:</b> Improving programming skill of students
XCA302	Database Management Systems	2015-2016	<b>Employability:</b> Improving programming skill of students
XCA303	Visual Programming	2016-2017	<b>Employability:</b> Improving programming skill of students

XCA304	Statistical and Numerical Methods	2015-2016	<b>Skill development:</b> -Solving the real world problem by mathematically
OE	Open Elective	2015-2016	*****
XUM306	Disaster Management	2019-2020	<b>Skill development:</b> -Solving the real world problem by understading environment
XCA307	Web Technology	2016-2017	<b>Employability:</b> Improving programming skill of students
XCA401	Data Analytics	2019-2020	<b>Employability:</b> Improving programming skill of students
XCA402	Java Programming	2016-2017	<b>Employability:</b> Improving programming skill of students
XCA403	Resource Management Techniques	2015-2016	<b>Skill development:</b> -Solving the real world problem by mathematically
XCA404	Operating Systems	2015-2016	<b>Employability:</b> Improving programming skill of students
OE	Open Elective	2015-2016	*****
XCA405	Software Testing Tools and Practices	2019-2020	<b>Employability:</b> Improving programming skill of students
XCA501	XML and Web Services	2016-2017	<b>Employability:</b> Improving programming skill of students
XCA502A	Software Engineering	2016-2017	<b>Employability:</b> Improving programming skill of students
XCA503A	Unix and Shell Programming	2015-2016	<b>Employability:</b> Improving programming skill of students
XCA504A	Enterprise Resource Planning	2017-2018	<b>Entrepreneurship:</b> Improving Entrepreneurship skills in business
OE	Open Elective	2019-2020	*****
XCA505	Android App Development - Mobile Technology	2019-2020	<b>Employability:</b> Improving programming skill of students
XCA506	Inplant Training	217-2018	<b>Employability:</b> Improving programming skill of students
XCA601	Introduction to Graphics Design	2016-2017	<b>Employability:</b> Improving programming skill of students
XCA602A	.Net Technologies	2016-2017	<b>Employability:</b> Improving programming skill of students

XCA603A	Mobile Computing	2017-2018	<b>Employability:</b> Improving programming skill of students
XCA604	Project Work	2020-2021	<b>Employability:</b> Improving programming skill of students

MCA			
2020-21 ACADEMIC YEAR (ODD and EVEN)			
YCA101	Database Management Systems	2019-2020	<b>Employability:</b> Improving programming skill of students
YCA102	Computer Networks	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA103	Object Oriented Programming, Analysis and Design	2019-2020	<b>Employability:</b> Improving programming skill of students
YCA104	Management Support Systems	2019-2020	<b>Employability:</b> Improving programming skill of students
YCA105	Mathematical Foundation for Computer Applications	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA106	Database Management Systems Lab	2019-2020	<b>Employability:</b> Improving programming skill of students
YCA107	Mathematical Foundation for Computer Applications Lab using Java	2020-2021	<b>Employability:</b> Improving presentation skill of students
YCA201	Advanced Operating System Concepts	2014-2015	<b>Employability:</b> Improving programming skill of students
YCA202	Software Engineering	2019-2020	<b>Employability:</b> Improving programming skill of students
YCAEE1	Data Mining and Data Warehousing	2014-2015	<b>Employability:</b> Improving programming skill of students
YCA203	Advanced Data Structures	2020-2021	<b>Employability:</b> Improving programming skill of students
YCABM4	Investment Technology	2019-2020	<b>Employability:</b> Improving programming skill of students
YCA205	Advanced Operating System Concepts Lab	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA206	Case Tools Lab	2019-2020	<b>Employability:</b> Improving programming skill of students
YCA301	Artificial Intelligence and Machine Learning	2020-2021	<b>Employability:</b> Improving programming skill of students

YCA302	Graphics and Multimedia	2015-2016	<b>Employability:</b> Improving programming skill of students
YCAEE1	Data Mining and Data Warehousing	2014-2015	<b>Employability:</b> Improving programming skill of students
YCABM4	Investment Technology	2019-2020	<b>Employability:</b> Improving programming skill of students
YCA303	Optimization Techniques	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA304	Artificial Intelligence and Machine Learning Lab using Python	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA305	Optimization Techniques Lab	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA306	Industrials Lectures	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA307	Mini Project	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA401	Research Methodology(Paper Publications)	2020-2021	<b>Employability:</b> Improving programming skill of students
YCA402	Project	2013-2014	<b>Employability:</b> Improving programming skill of students

## 2. Syllabus of Courses

### XCA103 C PROGRAMMING

#### Course Outcomes:

CO1	C	Knowledge	<i>Describe</i> the concept of C programming and its fundamental
CO2	C	Understand, Apply	<i>illustrate</i> and <i>implement</i> various control statements and arrays
	P	Guided Response	<i>Build</i> an application program using various controls statements and arrays
CO3	C	Understand, Apply	<i>Differentiate</i> and <i>Implement</i> structures and unions
	P	Guided Response	<i>Develop</i> an application program using structures and unions
CO4	C	Understand, Apply	<i>Explain</i> and <i>Implement</i> the pointer concepts
	P	Guided Response	<i>Develop</i> an application program using structures and unions
CO5	C	Understand, Adapt	<i>Develop</i> a program to create and process a file for different applications

COURSE CODE	COURSE NAME	L	T	P	C
<b>XCA103</b>	<b>C PROGRAMMING</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>5</b>
<b>C:P:A = 4:1:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
PREREQUISITE	Nil	<b>4</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>UNIT- I : INTRODUCTION TO C LANGUAGE</b>					<b>12+6</b>
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 Lab: 1.Program to implement formatted I/O operations 2.Program to implement unformatted I/O operations					
<b>UNIT- II : CONTROL STATEMENTS AND ARRAYS</b>					<b>12+6</b>
<b>Control Statements</b> - 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 Lab: 1. Program to implement control structures 2.Program to implement one dimensional and two dimensional arrays					
<b>UNIT- III: FUNCTIONS, STRUCTURE AND UNIONS</b>					<b>12+6</b>
<b>Functions</b> - 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() Lab: 1. Program to implement calling the function through call by value method&call by reference					

2. Program to implement Structures

#### UNIT- IV: POINTERS

12+6

**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.

Lab:

1. Program to implement dynamic memory allocation
2. Program to implement pointer to function
3. Program to implement an array of pointers

#### UNIT- V: FILE PROCESSING

12+6

**File Management in C** – Definition of Files- Opening modes of files- Standard function: fopen(), fclose(), feof(), fseek(),fwind()-fgetc(), fputc(), fscanf()-program using files

Lab:

1. Program to implement various file operations in a standard file
2. Program to implement various file operations in text file

	LECTURE	TUTORIAL	PRACTIC AL	TOTAL
	60	0	30	90

#### TEXT

1. E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.

#### 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.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 8	PSO 9
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
Cours e	3	2	2	1	1	1	1	2	1

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



## XCA 104 ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY

### Course Outcome:

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

COURSE CODE	COURSE NAME	L	T	P	C
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. Manicavachagom Pillay, T. Natarajan, K. S. Ganapathy, Algebra, Volume I , S.Vishvanathan Printers and Publishers Pvt., Ltd, Chennai 2004.					
2. S.Narayanan, T.K.Manicavachagam Pillay, S.Vishvanathan, Calculus volume I & II Printers and Publishers Pvt., Ltd, Chennai 2009,9th edition					



**REFERENCES**

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

**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 8	PSO 9
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

## XCA 105 COMPUTER ORGANIZATION AND ARCHITECTURE

**Course Outcomes:**

CO1	C	Knowledge	<i><b>Demonstrate</b></i> basic number systems, Boolean expression simplification and logic gates manipulation
CO2	C	Understand	<i><b>Explain</b></i> the functions of various components in digital system
CO3	C	Knowledge	<i><b>Describe</b></i> general Instruction types, formats, addressing modes and organization
CO4	C	Understand	<i><b>Summarize</b></i> various modes of Data transfer and interface
CO5	C	Knowledge	<i><b>Classifies</b></i> memory organization and management

COURSE CODE	COURSE NAME	L	T	P	C
<b>XCA 105</b>	<b>COMPUTER ORGANIZATION AND ARCHITECTURE</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>5</b>
<b>C:P:A = 5:0:0</b>					
PREREQUISITE	Number system	L	T	P	H
		<b>3</b>	<b>2</b>	<b>0</b>	<b>5</b>
<b>UNIT –I:NUMBER SYSTEM AND BOOLEAN LOGIC</b>					<b>15</b>
Introduction: Simple Computer Organization - <b>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</b>					

<b>UNIT- II: COMBINATIONAL AND SEQUENTIAL CIRCUIT</b>				<b>15</b>	
<b>Combinational Circuit</b> - Half adder, Full Adder - Decoders – Multiplexer – <b>Sequential circuit</b> - Flip Flops: RS, JK, D, T Flip Flops – Excitation Table – Master / Slave Flip Flop- Registers – Counters.					
<b>UNIT- III: INSTRUCTION FORMATS AND TYPES</b>				<b>15</b>	
<b>Instruction codes – Computer Registers- Basic Computer Instructions-Components of CPU</b> <b>General Register Organization – Instruction Format</b> – Instruction Type - Addressing Modes – Memory Reference Instructions – Data Transfer and ManipulationInstruction – Shift Instruction.					
<b>UNIT –IV: INPUT OUTPUT ORGANIZATION</b>				<b>15</b>	
Peripheral Devices – Input Interface – I/O Bus and Interface modules- Asynchronous Data Transfer – Modes of Transfer – Direct Memory Access.					
<b>UNIT- V: MEMORY ORGANIZATION</b>				<b>15</b>	
Memory Hierarchy – Main Memory - Auxiliary Memory – Associative Memory- Cache – Virtual Memory.					
			<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
			<b>45</b>	<b>30</b>	<b>75</b>
<b>TEXT</b>					
1. M.Morris Mano “Computer System Architecture”, Pearson Education, Third Edition 2007.					
2. M.Morris Mano “Digital Logic and Computer Design”, Pearson Education, 1979, Tenth Impression: 2008.					
<b>REFERENCES</b>					
1. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Eighth Edition, 2010.					
2. Thomas C.Bartee, “Computer Organization and Digital Logic” Pearson Education, Seventh Edition, 2006.					
3. John P.Hayes, ”Computer Architecture and Organization”, McGraw-Hill.					
<b>E REFERENCES</b>					
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.					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO8	PSO9
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

## XUM106 HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY

### Course Outcomes :

CO1	C	Remember	<b>Relate</b> and <b>Interpret</b> the human ethics and human relationships
CO2	C	Understanding, Applying	<b>Explain</b> and <b>Apply</b> gender issues, equality and violence against women
CO3	C	Analyzing, A Receiving	<b>Classify</b> and <b>Develop</b> the identify of human rights and their violations
CO4	C	Understanding, A Analyze	<b>Classify</b> and <b>Dissect</b> necessity of human rights and report on violations.
CO5	C	Remember, A Respond	<b>List</b> and <b>respond</b> to family values, universal brotherhood, fight against corruption by common man and good governance.

COURSE CODE	COURSE NAME	L	T	P	C
<b>XUM 106</b>	<b>HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>C:P:A =0:0:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>S H</b>
				<b>S</b>	
PREREQUISITE	Nil	<b>1</b>	<b>0</b>	<b>0</b>	<b>2 3</b>
<b>UNIT –I:HUMAN ETHICS AND VALUES</b>					<b>03</b>
<b>Human Ethics and values</b> - Understanding of oneself and others- motives and needs- Social service, Social Justice, Dignity and worth, Harmony in human relationship: Family and Society, Integrity and Competence, Caring and Sharing, Honesty and Courage, WHO's holistic development - Valuing Time, Co-operation, Commitment, Sympathy and Empathy, Self respect, Self-Confidence, character building and Personality.					
<b>UNIT- II: GENDER EQUALITY</b>					<b>03</b>
<b>Gender Equality</b> - Gender Vs Sex, Concepts, definition, Gender equity, equality, and empowerment. Status of Women in India Social, Economical, Education, Health, Employment, HDI, GDI, GEM. Contributions of Dr.B.R. Ambedkar, ThanthaiPeriyar and Phule to Women Empowerment.					
<b>UNIT- III: WOMEN ISSUES AND CHALLENGES</b>					<b>03</b>
<b>Women Issues and Challenges</b> - Female Infanticide, Female feticide, Violence against women, Domestic violence, Sexual Harassment, Trafficking, Access to education, Marriage. Remedial Measures – Acts related to women: Political Right, Property Rights, Right to Education, Medical Termination of Pregnancy Act, and Dowry Prohibition Act.					
<b>UNIT- IV: HUMAN RIGHTS</b>					<b>03</b>
<b>Human Rights Movement in India</b> – The preamble to the Constitution of India, Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economical, Social and Cultural Rights, Rights against torture, Discrimination and forced Labour, Rights of Children. National Human Rights Commission and other statutory Commissions, Creation of Human Rights Literacy and Awareness. - Intellectual Property Rights (IPR). National Policy on occupational safety, occupational health and working environment.					

<b>UNIT- V: GOOD GOVERNANCE AND ADDRESSING SOCIAL ISSUES</b>	<b>03</b>
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Good Governance - Democracy, People's Participation, Transparency in governance and audit, Corruption, Impact of corruption on society, whom to make corruption complaints, fight against corruption and related issues, Fairness in criminal justice administration, Government system of Redressal. Creation of People friendly environment and universal brotherhood.

	LECTURE	TOTAL
	15	15

#### REFERENCES

1. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
2. Veeramani, K. (ed) Periyar Feminism, (PeriyarManiammai University, Vallam, Thanjavur: 2010).
3. Planning Commission report on Occupational Health and Safety  
[http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg\\_occup\\_safety.p](http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p)
4. Central Vigilance Commission (Gov. of India) website: <http://cvc.nic.in/welcome.html>.
5. Weblink of Transparency International: <https://www.transparency.org/>
6. Weblink Status report: <https://www.hrw.org/world-report/2015/country-chapters/india>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 8	PSO 9
CO 1	0	0	0	0	2	2	1	0	0
CO 2	0	0	0	0	2	2	0	0	0
CO 3	0	0	0	0	0	2	0	0	0
CO 4	0	0	0	0	0	2	1	0	0
CO 5	0	0	0	0	0	3	0	0	0
Total	0	0	0	0	4	11	2	0	0
Course	0	0	0	0	1	3	1	0	0

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

## XES202 ENVIRONMENTAL STUDIES

### Course Outcomes

CO1	C	Remember	<i>Describe</i> the significance of natural resources and <i>explain</i> anthropogenic impacts.
CO2	C	Understand	<i>Illustrate</i> the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance
CO3	C	Remember	<i>Identify</i> the facts, consequences, preventive measures of major pollutions and <i>recognize</i> the disaster phenomenon
CO4	C	Understand	<i>Explain</i> the socio-economic, policy dynamics and <i>practice</i> the control measures of global issues for sustainable development
CO5	C	Understand	<i>Recognize</i> the impact of population and the concept of various welfare programs, and <i>apply</i> the modern technology towards environmental protection

COURSE CODE	COURSE NAME	L	T	P	C
XES202	ENVIRONMENTAL STUDIES	2	0	0	2
C:P:A = 1.8: 0 : 0.2					
		L	T	P	S S H
PREREQUISITE	Nil	2	0	0	1 3
<b>UNIT – I: INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY</b>					<b>6</b>
Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, flood, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.					
<b>UNIT – II: ECOSYSTEMS AND BIODIVERSITY</b>					<b>6</b>
Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.					
<b>UNIT – III: ENVIRONMENTAL POLLUTION</b>					<b>6</b>
Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: flood, earthquake, cyclone and landslide.					

<b>UNIT –IV : SOCIAL ISSUES AND THE ENVIRONMENT</b>			<b>6</b>
<b>Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.</b>			
<b>UNIT –V: HUMAN POPULATION AND THE ENVIRONMENT</b>			<b>6</b>
<b>Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education - HIV / AIDS – Women and Child welfare programme– Role of Information Technology in Environment and human health – Case studies.</b>			
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>30</b>	<b>0</b>	<b>30</b>
<b>TEXT BOOKS</b>			
<ol style="list-style-type: none"> <li>1. <b>Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.</b></li> <li>2. <b>Michael Begon,RobertW,Howarth,ColinR.Townsend," Essentials of Ecology", Wiley, 2014</b></li> <li>3. <b>Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers &amp; Distributors Pvt. Ltd, New Delhi, 2006.</b></li> <li>4. <b>Introduction to International disaster management, Butterworth Heinemann, 2006.</b></li> </ol>			
<b>REFERENCE BOOKS</b>			
<ol style="list-style-type: none"> <li>1. <b>Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol.I and II, Enviro Media, India, 2009.</b></li> <li>2. <b>S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.</b></li> <li>3. <b>Sundar, Disaster Management, Sarup&amp; Sons, New Delhi, 2007.</b></li> <li>4. <b>G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.</b></li> </ol>			
<b>E RESOURCES</b>			
<ol style="list-style-type: none"> <li>1. <a href="http://www.e-booksdirectory.com/details.php?ebook=10526">http://www.e-booksdirectory.com/details.php?ebook=10526</a></li> <li>2. <a href="https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science">https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science</a></li> <li>3. <a href="https://www.free-ebooks.net/ebook/What-is-Biodiversity">https://www.free-ebooks.net/ebook/What-is-Biodiversity</a></li> <li>4. <a href="https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4">https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4</a></li> <li>5. <a href="http://bookboon.com/en/pollution-prevention-and-control-ebook">http://bookboon.com/en/pollution-prevention-and-control-ebook</a></li> <li>6. <a href="http://www.e-booksdirectory.com/details.php?ebook=8557">http://www.e-booksdirectory.com/details.php?ebook=8557</a></li> <li>7. <a href="http://www.e-booksdirectory.com/details.php?ebook=6804">http://www.e-booksdirectory.com/details.php?ebook=6804</a></li> <li>8. <a href="http://bookboon.com/en/atmospheric-pollution-ebook">http://bookboon.com/en/atmospheric-pollution-ebook</a></li> <li>9. <a href="http://www.e-booksdirectory.com/details.php?ebook=3749">http://www.e-booksdirectory.com/details.php?ebook=3749</a></li> <li>10. <a href="http://www.e-booksdirectory.com/details.php?ebook=2604">http://www.e-booksdirectory.com/details.php?ebook=2604</a></li> <li>11. <a href="http://www.e-booksdirectory.com/details.php?ebook=2116">http://www.e-booksdirectory.com/details.php?ebook=2116</a></li> <li>12. <a href="http://www.e-booksdirectory.com/details.php?ebook=1026">http://www.e-booksdirectory.com/details.php?ebook=1026</a></li> <li>13. <a href="http://www.faadooengineers.com/threads/7894-Environmental-Science">http://www.faadooengineers.com/threads/7894-Environmental-Science</a></li> </ol>			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	0	0	3	0	0	3	2
CO2	0	0	1	0	0	2	0
CO3	0	0	3	0	0	3	2
CO4	0	0	3	0	0	3	2
CO5	2	0	2	1	0	3	3
Total	2	0	12	1	0	14	9
Course	1	0	3	1	0	3	2

0-No Relation, 1- Low Relation, 2 – Medium Relation, 3- High Relation

### XCA203 OBJECT ORIENTED PROGRAMMING WITH C++

#### Course Outcomes:

CO1	Cognitive	Remember	<i>Define basic concepts</i> on object oriented programming
	Psychomotor	Apply	<i>Apply</i> structure and inline functions
CO2	Cognitive	Understand	<i>Explain</i> the types of inheritances and <i>Applying</i> various levels of Inheritance for real time problems
	Psychomotor	Apply	<i>Apply</i> the OOPs concepts class and object
CO3	Cognitive	Understand	<i>Explain</i> the operator Overloading functions
	Psychomotor	Apply	<i>Apply</i> various overloading methods for different applications
CO4	Cognitive	Understand	<i>Describe</i> and <i>apply</i> the Polymorphism concepts
	Affective	Apply	<i>Apply and implement</i> operator overloading functions <i>Responding</i> on design of dynamic memory allocation
CO5	Cognitive	Understand	<i>Define and explain</i> file concept and exception handlings in C++ <i>Apply and implement</i> file operations

COURSE CODE	COURSE NAME	L	T	P	C
XCA203	OBJECT ORIENTED PROGRAMMING WITH C++	4	0	1	5
C:P:A =3:1:1					
PREREQUISITE	C Programming	4	0	2	6
UNIT- I :INTRODUCTION TO C++				12+6	
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 - Functions in C++ - Inline functions – Function Overloading.					
Lab:					
1. Implement Various Control Structures.					
2. Demonstrate Inline Functions					
3. Implement Structure & Unions					
UNIT- II: CLASSES AND OBJECTS				12+6	
Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – classes – Constructor and destructor with static members.					



Lab:

1. Implement Class and Subclass
2. Demonstrate Constructors & Destructors.
3. Programs to Implement Friend Function

### UNIT- III: OPERATOR OVERLOADING AND INHERITANCE

12+6

Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.

Lab:

1. Implement Multilevel Inheritance
2. Implement Multiple Inheritance –Access Specifiers
3. Implement Hierarchical inheritance – Function Overriding /Virtual Function

### UNIT-IV: POINTERS AND POLYMORPHISM

12+6

Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding , Polymorphism and Virtual Functions.

Lab:

1. Programs to Overload Unary & Binary Operators as Member Function & Non Member Function.

### UNIT- V: FILES

12+6

File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .

Lab:

1. Program to implement file operations

	LECTURE	PRACTICAL	TUTORIAL	TOTAL
	60	30	0	90

### TEXT

1. Ashok N Kamthane , Object-Oriented Programming With ANSI andTURBOC C++, Pearson Education publication. 2003.

### 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	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

## XCA204 - DISCRETE MATHEMATICS

### Course Outcomes:

CO1	C	Remember,	<b>Define</b> 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	<b>Explain</b> the basic concepts of logic to calculate the normal forms, tautologies and contradiction.
CO3	C	Apply	<b>Apply</b> the counting principle permutation and combination and pigeonhole principle to <b>solve</b> the problem.
	P	Guided Response	Reproduce model related to counting principle
CO4	C	Remember, Understand	<b>Explain</b> the types of lattices and to <b>show</b> lattices as partially ordered sets.
CO5	C	Understand	<b>Explain</b> the properties of semi groups and groups and any set with binary operation as a semigroup and group with examples.

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 8	PSO 9
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	Understand	<i>Explain</i> the OSI reference model used in the network
CO2	C	Understand	<i>Describe</i> the DLL services and different protocols.
	P	Perceive	<i>Differentiate</i> various networking commands and its functions
CO3	C	Knowledge	<i>Compare</i> the various routing algorithms.
	A	Receive	<i>Describes</i> the congestion control in the network layer
	P	Guided Response	<i>Builds</i> a program for the congestion control
CO4	C	Understand	<i>Demonstrate</i> and <i>Illustrate</i> the transport layer and the congestion control algorithm.
	A	Organize	<i>Integrates</i> different socket programming using TCP and UDP
	P	Adapt	<i>Adapts</i> different RAW sockets for packet capturing and filtering
CO5	C	Understand	<i>Summarize</i> the application layer and the naming service.

COURSE CODE	COURSE NAME	L	T	P	C
XCA205	COMPUTER NETWORKS	3	1	0	4
C:P:A = 3:0.5:0.5					
		L	T	P	H
PREREQUISITE	Nil	3	1	0	4
UNIT-I : OVERVIEW OF COMPUTER NETWORKS					12
Network hardware- Network software- Protocol Hierarchies – Layering – Interfaces, services, primitives – OSI reference Model – TCP/IP reference model – physical layer – transmission media - Wireless transmission – switching.					
Lab:					
1. Study of network commands in C.					
2. Using TCP sockets and find the date time of a server and the client					
UNIT – II : DATA LINK LAYER					12
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					
Lab:					
1. Simulate Stop-wait-Protocol					
2. Simulate Sliding window protocol					
UNIT-III: NETWORK LAYER					12
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					
Lab:					
1. Develop a program to connect the echo server & client using TCP sockets.					
2. Develop a program to create a chat module using TCP sockets					
UNIT- IV: TRANSPORTATION LAYER					12
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.					
Lab:					
1. Develop a program for resolving the DNS server using UDP sockets					
2. Implement domain naming server using sockets.					
3. Implement the packet capturing and filtering procedure using raw socket					
UNIT- V: APPLICATION LAYER					12
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					
Lab:					
1. Develop a program for remote procedure call.					
2. Simulate the Address resolution protocol using UDP.					
3. Simulate a program study the performance of TCP					
	LECTURE	TUTORIAL	PRACTICALS	TOTAL	
	45	15	0	60	
TEXT					
1. Andrew Tanenbaum , Computer Networks, PHI, 3rd Edition.					
2. Larry Peterson and Bruce Davie, Computer Networks: A Systems Approach, 4th Ed. 2007.					
REFERENCES					
1. William Stalling,Computer networks – PHI					

## E REFERENCES

1. <http://nptel.ac.in/courses/106105081/>
2. Computer Network Topology, Prof.Sujoy Gosh,<http://nptel.ac.in/video.php?subjectId=106105081>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 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

## XCA206 DATA STRUCTURES AND ALGORITHMS

### Course Outcomes:

CO1	C	Understand	<b>Illustrate</b> the classification of data types and operations of stack.
	P	Guided Response	<b>Build</b> a program to implement the operations of stack.
	A	Receive	<b>Chooses</b> various applications that function as stack.
CO2	C	Understand	<b>Explain</b> the functions of queue and its types
	P	GuidedResponse	<b>Build</b> a program to implement the operations of queue.
	A	Respond	<b>Selects</b> the real word applications in queue
CO3	C	Understand	<b>Describe</b> the operations of linked list and its advantages
	P	Guided Response	<b>Build</b> an application to demonstrate the functions of linked list
	A	Respond	<b>Practices</b> the linked list concept in real time applications
CO4	C	Knowledge	<b>Recall</b> the recursion function in various problems.
	A	Respond	<b>Writes</b> the recursion program for various problems in C
CO5	C	Understand	<b>Describe</b> the concepts of tree and sorting
	P	Guided Response	<b>Build</b> an application in C for traversing a tree and sorting concept
	A	Receive	<b>Gives</b> the importance of tree traversing and sorting techniques.

COURSE CODE	COURSE NAME	L	T	P	C
XCA206	DATA STRUCTURES ANDALGORITHMS	4	0	1	5
C:P:A = 3.8:1:0.2					
		L	T	P	H

PREREQUISITE	C Programming	4	0	2	6
UNIT- I:INTRODUCTION TO DATA STRUCTURES AND STACK					12+6
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.					
Lab:					
1. Create a Stack and do the following operations using array (i)Push (ii) Pop (iii) Peep					
UNIT –II: QUEUE					12+6
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.					
Lab:					
1. Create a Queue and do the following operations using array(i)Add (ii) Remove					
UNIT- III: LINKED LIST					12+6
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.					
Lab:					
1. Implement the operations on singly linked list.					
UNIT- IV: RECURSION					12+6
Definition, Recursion in C, writing recursive programs – Binomial coefficient, Fibonacci, GCD, Factorial etc.					
UNIT- V: TREE AND SORTING TECHNIQUES					12+6
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.					
Lab:					
1. Implement the following operations on a binary search tree.					
(i) Insert a node (ii) Delete a node					
2. Create a binary search tree and do the following traversals					
(i)In-order (ii) Pre order (iii) Post order					
3. Sort the given list of numbers using insertion sort					
4. Sort the given list of numbers using quick sort.					
5. Perform the following operations in a given graph					
(i) Depth first search (ii) Breadth first search					
	LECTURE	TUTORIAL	PRACTICALS	TOTAL	
	60	0	30	90	
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. Robert L Kruse: Data Structures and program designing using C, 2013.					
2. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005					

## 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	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	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

## XCA301 HTML AND DHTML

### Course Outcomes:

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

COURSE CODE	COURSE NAME	L	T	P	C
XCA301	HTML AND DHTML	1	0	1	2
C:P:A = 1:0.5:0.5					
		L	T	P	H
PREREQUISITE	Nil	1	0	2	3
UNIT- I:INTRODUCTION TO HTML				15	



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.

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

## UNIT- II: FRAMES AND FORMS

15

**Frames:** Frameset Definition – Frame Definition – Nested Framesets – HTML and other Media types - Forms: Forms and their Elements.

Lab:

1. Create an E-Learning document using Frames.
2. Design a Login Web page using HTML Forms.

## UNIT – III : DHTML

15

**Document Object Model** – HTML and Scripting Access – Rollover Buttons – Moving objects with DHTML – Ramifications ofDHTML– Introduction to java script – Fundamentals of CSS.

Lab:

1. Design a web page using DHTML filter concept.
2. Create a web page to perform the addition of two numbers using java script.
3. Design a web page with CSS.

	LECTURE	PRACTICAL	TOTAL
	15	30	45

## TEXT

1. Thomas A.Powell, “HTML: The complete Reference”, Tata McGraw Hill Publications Second Edition, 1999.
2. Robert W.Sebesta, “Programming the World Wide Web”, Pearson Education, Third Edition, 2007.
3. C.Xavier, “World Wide Web Designing”, Tata McGraw Hill, 2000.

## REFERENCES

1. Wendy Willard, “Web Design-Beginners Guide” Tata McGrawHill, 2001.
2. Ivan Bayross, “Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP”, Fourth Edition, BPB Publications, New Delhi, 2010.

## 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	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

## XCA302 DATABASE MANAGEMENT SYSTEMS

### Course Outcomes:

CO1	C	Knowledge	<i>Describe</i> the database architecture and its applications
		Apply	<i>Sketch</i> the ER diagram for real world applications
	A	Receive	<i>Uses</i> various ER diagram for a similar concepts from various sources
CO2	C	Understand	<i>Discuss</i> about the relational algebra and calculus
	P	Guided Response	<i>Construct</i> various queries in SQL and PL/SQL
	A	Respond	<i>Compiles</i> various queries in SQL, Relational Calculus and Algebra
CO3	C	Knowledge	<i>Describe</i> the various normalization forms
		Apply	<i>Apply</i> the normalization concepts for a table of data
	A	Receive	<i>Practices</i> a table and implement the normalization concepts
CO4	C	Understand	<i>Explain</i> the storage and accessing of data.
CO5	C	Understand	<i>Illustrate</i> the query processing in database management.
		Knowledge	<i>Define</i> the concurrency control and deadlock concept

COURSE CODE	COURSE NAME	L	T	P	C
<b>XCA302</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>5</b>
<b>C:P:A = 3: 1.75: 0.25</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
PREREQUISITE	Nil	<b>4</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>UNIT- I : DATABASE ARCHITECTURE AND ER DIAGRAM</b>					<b>18</b>
Database system applications - Purpose of database systems - View of data- Database languages - Database architecture - Database users and administrators - History of database systems- <b>Entity relationship modeling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, sub classes; super classes, inheritance, specialization and generalization</b>					
<b>UNIT- II: RELATIONAL DATA MODEL</b>					<b>18</b>
Relational model concepts, Relational constraints, Relational Languages : Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - <b>SQL: Basic Structure-Set Operations- Aggregate Functions-Null Value-Nested Sub Queries-Views Complex Queries-Modification Of Database-Joined Relations-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions- -Integrity and Security.</b>					
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

### UNIT – III: DATA NORMALIZATION

18

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

18

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

### UNIT- V: QUERY PROCESSING AND TRANSACTION MANAGEMENT

18

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

	LECTURE	TUTORIAL	PRACTICALS	TOTAL
	60	0	30	90

### TEXT

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010.
2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition, 2002

### REFERENCES

1. Bipin Desai, An Introduction to database systems, Galgotia Publications, 2010.
2. RamezElamassri, Shankant B-Navathe, Fundamentals of Database Systems, Pearson, 7<sup>th</sup> Edition, 2015

### E REFERENCES

1. NPTEL, Introduction to database design, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. NPTEL, Indexing and Searching Techniques in Databases Dr. Arnab Bhattacharya, IIT Kanpur

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 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

## XCA 303 VISUAL PROGRAMMING

### Course Outcomes:

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

COURSE CODE	COURSE NAME	L	T	P	C
<b>XCA 303</b>	<b>VISUAL PROGRAMMING</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>5</b>
<b>C:P:A = 3:2:0</b>					
		L	T	P	H
PREREQUISITE	C++ concepts	4	0	2	6
<b>UNIT- I :INTRODUCTION ON WINDOWS PROGRAMMING</b>					<b>18</b>
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 – Scroll Bars – Keyboard – Mouse – Menus - Software Development Kit (SDK) Tools.					
<b>UNIT- II: VISUAL BASIC PROGRAMMING</b>					<b>18</b>
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.					
Lab:					
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					
<b>UNIT- III: ADVANCED CONTROLS</b>					<b>18</b>
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.					
Lab:					
1. Design a simple MDI Text Editor in visual Basic					
2. Designa Digital Clock in Visual Basic					
3. Write a visual basic code for creating simple applications with file system controls					
<b>UNIT- IV: ODBC AND DATABASE ENGINES</b>					<b>18</b>
Database Manager – Data Control – Record set Objects – DAO – Manipulation of records – Database Management with ODBC – RDO –ADO – ADO Control – Data Grid Control – Database Applications.					
Lab:					
1. Create, Update and Manipulate a content in Database					
<b>UNIT- V: VISUAL C++</b>					<b>18</b>
VC++ Components – MFC - Resources – Getting started with AppWizard – Class Wizard -					

Main Window Object – Device Context - Event Handling: Handling Mouse – Graphics Device Interface - Pen, Brush, Colors, Fonts - Modal and Modeless Dialogs – Document View Architecture – Serialization – Connecting to database using VC++.

Lab:

1. Create a code for drawing various two dimensional objects
2. Create VC++ code to manipulate Mouse Interface
3. Design a code to manipulate Menu bar and Tool bar applications
4. Design a code for displaying Message Box
5. Design VC++ code for Document View Architecture
6. Create SDI & MDI applications, Modal and Modeless dialog.
7. Design VC++ code for manipulating DLLs
8. Design a code in VC++ to access data through ODBC

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	60	0	30	90

#### TEXT

1. Charles Petzold, " Programming Windows", 6<sup>th</sup> 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, 3<sup>rd</sup> 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 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	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

### XCA304 STATISTICAL AND NUMERICAL METHODS

#### Course Outcomes:

- CO1    C    Remember    *Explain* the statistical data in the form of table, diagram and Understand    graph and to *find* various statistics, correlation, rank correlation and regression coefficients.

CO2	C	Remember	<i>Define</i> null and alternate hypothesis and to <i>Apply</i> test statistic.
CO3	C	Remember	<i>Defined</i> discrete and continuous random variables and to <i>Find</i> the expected values and moment generating functions of discrete and continuous distributions.
CO4	C	Understand	<i>Explain</i> computational numerical methods to <i>Solve</i> algebraic and transcendental equations and systems of linear equations.
CO5	C	Apply	<i>Solve</i> the Numerical Differentiation and Integration and to <i>Apply</i> the Trapezoidal and Simpson's rules.

COURSE CODE	COURSE NAME	L	T	P	C
XCA304	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 – $\chi^2$ -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,25 <sup>th</sup> 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

## XCA401 DATA ANALYTICS

### Course Outcomes:

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

COURSE CODE	COURSE NAME	L	T	P	C
<b>XCA401</b>	<b>DATA ANALYTICS</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>
<b>C:P:A = 1:0.5:0.5</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
PREREQUISITE	Nil	<b>1</b>	<b>0</b>	<b>2</b>	<b>3</b>
<b>UNIT -I :INTRODUCTION TO WORKSHEET</b>					



			<b>15</b>
Getting Started with Excel: <b>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.</b>			
Lab:			
<ol style="list-style-type: none"> <li>1. Create a table to perform statistical and mathematical functions.</li> <li>2. Create a spreadsheet to sort data and print portions of a worksheet.</li> <li>3. Import and Export the data from the database and files.</li> </ol>			
<b>UNIT- II: DATA ANALYSIS IN CHARTS</b>			<b>15</b>
<b>Working with Charts:</b> Excel Charts – Scatter Plots – Editing a chart – Identifying Data Points: Creating Bubble Plots – Breaking a scatter plot into categories – Plotting Several Variable.			
Lab:			
<ol style="list-style-type: none"> <li>1. Create a spreadsheet to perform “What if?” calculations.</li> <li>2. Demonstrates the ease of creating charts.</li> <li>3. Draw a Histogram Diagram in MS-Excel using student data set.</li> </ol>			
<b>UNIT- III: STATISTICAL ANALYSIS</b>			<b>15</b>
<b>Describe Data: Variables and Descriptive Statistics - Frequency Tables :</b>			
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.			
Lab:			
<ol style="list-style-type: none"> <li>1. Perform Regression analysis with given dataset.</li> <li>2. Perform correlation analysis with given data.</li> <li>3. Create pivot table and carry out the analysis with charts.</li> </ol>			
		<b>LECTURE</b>	<b>PRACTICA</b>
		<b>L</b>	<b>TOTAL</b>
		<b>15</b>	<b>30</b>
			<b>45</b>
<b>TEXT</b>			
<ol style="list-style-type: none"> <li>1. Kenneth N.Berk&amp; Patrick Carey, “Data Analysis with Microsoft Excel”, 3<sup>rd</sup> Edition.</li> <li>2. John Walkenbach, “Microsoft Office Excel 2007”, Wiley Publishing Inc., 2007.</li> </ol>			
<b>REFERENCES</b>			
<ol style="list-style-type: none"> <li>1. Curtis Frye, “Step by Step Microsoft Office Excel 2007”, First Edition, Microsoft Press.</li> <li>2. Marg, Craig Stinson, “Microsoft Office Excel 2007 inside and outside”, First Edition, Microsoft Press.</li> </ol>			
<b>E REFERENCES</b>			
1.NPTEL, Dr.NandanSudarsanam, Dr.BalaramanRavindran, IIT, “Introduction to Data Analytics”.			

	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	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	Knowledge	<i>Explain</i> the history and features of java
CO2	C	Understand	<i>Describe</i> and <i>implement</i> the class, packages and interfaces
		Apply	
	A	Response	<i>Participating</i> in creating packages and interfaces for applications domain.
CO3	C	Understand	<i>Describe</i> and <i>implement</i> the inheritance concepts
		Apply	
	P	Set	<i>Implement</i> various level of inheritance for given applications
CO4	C	Understand	<i>Describe</i> and <i>implement</i> various types of exception and its handling methods
		Apply	
	P	GR	<i>Build</i> a program to implement exception handling concepts
CO5	C	Apply	<i>illustrate</i> the Applets methods in Graphics, AWT controls and event handling
	P	GR	<i>Build</i> an application using event handling method

COURSE CODE	COURSE NAME	L	T	P	C
XCA402	JAVA PROGRAMMING	4	0	1	5
C:P:A = 3:1.5 :0.5					
		L	T	P	H
PREREQUISITE	C++ Programming	4	0	2	6
UNIT- I: INTRODUCTION					18
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 StringBuffer.					
Lab					
1.Program to implement simple programs based on operators, Loop and decision making statements.					
2.Program to implement array					
UNIT- II: CLASSES, INTERFACES AND PACKAGES					18
Classes-Objects-Wrapper Classes-Packages and Interfaces-extending interfaces-implementing interfaces-abstract methods.					
Lab					
1.Program to implement a class and instantiate its object.					
2.Program to demonstrate the use of interfaces.					

3. Program to implement user-defined and pre-defined packages.

### UNIT- III: INHERITANCE

18

Inheritance Extending classes-overriding methods-finalize methods-Abstract and Final classes-Interfaces and Inheritance.

Lab

1. Program to implement constructor and overloading concepts
2. Program to implement wrapper classes.
3. Program to implement string class and string buffer class.
4. Program to implement single level and multi level inheritance.

### UNIT- IV: EXCEPTION HANDLING

18

Error Handling and Exception Handling-Exception Types and Hierarchy-Try Catch blocks-Use of Throw, Throws and Finally- Programmer Defined Exceptions.

Lab

1. Program to implement exception handling.

### UNIT- V: APPLETS, GRAPHICS AND FILES

18

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.

Lab

1. Program to implement a simple applet.
2. Program to implement an applet using graphics class.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
60		30	90

### TEXT

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

### REFERENCES

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

### E REFERENCES

1. [http://www.nptelvideos.com/java/java\\_video\\_lectures\\_tutorials.php](http://www.nptelvideos.com/java/java_video_lectures_tutorials.php)
2. [http://www.nptelvideos.com/java/java\\_video\\_lectures\\_tutorials.php](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 8	PSO 9
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	<i>Explain</i> the basic concepts of optimization and to formulate
		Apply	and <i>Solve</i> Linear Programming problems.
CO2	C	Understanding	<i>Explain</i> and <i>Apply</i> the concepts of Transportation problem and
		Apply	Assignment problem.
CO3	C	Understanding	<i>Explain</i> and Apply the concepts of sequencing problem
		Apply	
CO4	C	Apply	<i>Explain</i> and <i>Demonstrate</i> the basic concepts of PERT-CPM and their applications in product planning control.
CO5	C	Understanding	<i>Solve</i> the Minimal Spanning Tree Problem, Shortest Route Problem, Maximal Flow Problem and Minimal Cost
		Apply	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,					

Pearson Education, Inc., 2008
2. Kantiswaroop, Gupta P.K and Manmohan, Operations Research, Sultan Chand & Sons, New Delhi, 2008
<b>REFERENCES</b>
1. Prem Kumar Gupta and D.S. Hira, Operations Research, S. Chand and Co., Ltd. New Delhi, 2008.
2. Gupta R. K., Linear Programming, Krishna Prakashan Media (P) Ltd., 2009.
<b>E REFERENCES</b>
1. Lecture Series on Fundamentals of Operations Research by Prof. G. Srinivasan, Department of Management Studies, IIT Madras. For more details on NPTEL visit <a href="http://nptel.iitm.ac.in">http://nptel.iitm.ac.in</a>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 8	PSO 9
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	<b>Explain</b> the operating system functions
CO2	C	Understanding	<b>Implement</b> the process and various process scheduling algorithms
	P	Adapt	<b>Executes</b> the different types of scheduling algorithms
CO3	C	Knowledge	<b>Outline</b> process cooperation and inter process communication
	A	Receive	<b>Recognize</b> the principles of concurrency
	P	Guided Response	<b>Builds</b> a program model for deadlock prevention and avoidance
CO4	C	Understanding	<b>Describe</b> various memory management concepts
	A	Organize	<b>Integrates</b> different memory management techniques
	P	Adapt	<b>Apply</b> the fixed size and variable size page replacement algorithm
CO5	C	Understanding	<b>Implement</b> and <b>understand</b> the file organization

COURSE CODE	COURSE NAME	L	T	P	C
XCA404	OPERATING SYSTEMS	4	0	1	5

<b>C:P:A = 3:1.5:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>PREREQUISITE</b>	C++ concepts, Windows Programming	<b>4</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>UNIT I OVERVIEW OF OPERATING SYSTEMS</b>					<b>18</b>
Functionalities and objectives of operating Systems- processor register- instruction execution- interrupts- types of interrupts.					
<b>UNIT II PROCESS MANAGEMENT</b>					<b>18</b>
Process concepts: process states- process control block- process and threads- processor scheduling- scheduling algorithms.					
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					
<b>UNIT III PRINCIPLES OF CONCURRENCY</b>					<b>18</b>
Critical Sections - Mutual Exclusion - Process Cooperation- Inter Process Communication- Deadlock Prevention- Detection- Avoidance- Semaphores- Monitors-Message Passing.					
Lab:					
1. Simulate MVT and MFT					
2. Simulate Bankers algorithm for Deadlock Avoidance					
3. Simulate Bankers Algorithm for deadlock Prevention					
<b>UNIT IV MEMORY MANAGEMENT</b>					<b>18</b>
Virtual Memory Concepts- Paging and Segmentation- Address Mapping- Virtual Storage Management- Page Replacement Strategies.					
Lab :					
1. Simulate FIFO Page Replacement Algorithms					
2. Simulate LRU Page Replacement Algorithms					
3. Simulate Optimal Page Replacement Algorithms					
4. Simulate Paging Technique of Memory Management					
<b>UNIT V FILE ORGANIZATION</b>					<b>18</b>
Blocking and buffering, file descriptor- file and directory structures- I/O devices- disk scheduling.					
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
	<b>60</b>	<b>-</b>	<b>30</b>	<b>90</b>	
<b>TEXT</b>					
1. William Stallings, Operating Systems , Prentice Hall of India (P) Ltd, 7 <sup>th</sup> edition-2012.					
2. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, Sixth edition. Addison-Wesley (2003).					
<b>REFERENCES</b>					
1. Andrew Tanenbaum, "Modern Operating Systems", Pearson, 2008.					
2. Silberschatz and P. B. Galvin, "Operating System Concepts", 7 <sup>th</sup> Edition, Addison Wesley Publication.					
<b>E REFERENCES</b>					
1. <a href="http://www.nptel.ac.in/courses/106108101/">http://www.nptel.ac.in/courses/106108101/</a>					
2. <a href="http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html">http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html</a>					
3. <a href="http://www.nptel.ac.in/downloads/106108101/">http://www.nptel.ac.in/downloads/106108101/</a>					

	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

### **XCA501 XML AND WEB SERVICES**

#### **Course Outcomes:**

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



<b>UNIT –II: XML TECHNOLOGY FAMILY</b>		<b>15</b>
XML - Name Spaces - Structuring With Schemas and DTD - Presentation Techniques - Transformation - XML Infrastructure.		
Lab:		
<div>1. Create a XML document to store resumes for a job web site and create the External DTD file.</div> <div>2. Create a XML schema for the book’s XML document.</div> <div>3. Present the book’s XML document using cascading style sheets (CSS).</div> <div>4. Write a XSLT program to extract book titles, authors, publications, book rating from the book’s XML document and use formatting.</div>		
<b>UNIT – III: WEB SERVICES BUILDING BLOCK</b>		<b>15</b>
Overview Of SOAP - HTTP - XML-RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns and Faults - SOAP with Attachments		
Lab:		
<div>1. Use Microsoft DOM to navigate and extract information from the book’s XML document.</div> <div>2. Create a web service for temperature conversion with appropriate client program.</div>		
	<b>LECTURE</b>	<b>PRACTICAL</b>
	<b>15</b>	<b>30</b>
		<b>TOTAL</b>
		<b>45</b>
<b>TEXT</b>		
<div>1. Ron Schmelzer, Travis Vandersypen and Jason Bloomberg, “XML and Web Services”, Pearson Education, 2002.</div> <div>2. Eric Newcomer and Greg Lomow, “Understanding SOA with Web Services”, PearsonEducation, 2005.</div> <div>3. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect's Guide”, Prentice Hall, 2004.</div>		
<b>REFERENCES</b>		
<div>1. Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002.</div> <div>2. Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education,2003.</div>		
<b>E REFERENCES</b>		
<div>1. <a href="https://www.w3.org/">https://www.w3.org/</a></div> <div>2. <a href="http://www.w3schools.com/">http://www.w3schools.com/</a></div>		

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

COURSE CODE	COURSE NAME	L	T	P	C
XCA502A	SOFTWARE ENGINEERING	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	4	1	0	5
UNIT- I : SOFTWARE PROCESS MODELS					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. Jalote Pankaj, An Integrated Approach to Software Engineering, Third Edition, Narosa Book Distributors Pvt Ltd, 2005.					
REFERENCES					
1. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli, Fundamentals of Software Engineering, Prentice Hall Of India, 1991.					
2. I. Sommerville, Software Engineering, Eighth Edition, Pearson Education, 2006					
E REFERENCES					
1. NPTEL, Software Engineering, Prof. N. L. Sarda Computer Science & Engineering Indian Institute of Technology, Bombay					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 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	<b>Explain</b> UNIX operating system and architectures
	P	Guided Response	<b>Builds</b> an operating system environment to work with various applications.
	A	Responding	<b>Performs</b> networking commands in an operating system
CO2	C	Understanding	<b>Explain</b> UNIX File Systems and Commands
	A	Responding	<b>Selects</b> commands to perform the execution
CO3	C	Understanding	<b>Describe</b> the operating system processes and its execution
	P	Guided Response	<b>Manipulate</b> the UNIX processes
CO4	C	Understanding	<b>Explain</b> the Shell Environment concepts
	P	Guided Response	<b>Displays</b> the Shell environment and processing technique
CO5	C	Understanding	<b>Explain</b> Shell Programming statements
	P	Set	<b>Starts</b> to work with Shell Programming
	A	Responding	<b>Practices</b> 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
<b>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.</b>					
<b>Lab:</b>					
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.					

<b>UNIT –II: FILE SYSTEM</b>				<b>18</b>
<b>File – File name – File System Hierarchy – Unix File System – Absolute Pathnames and commands – Home Directory – Unix Commands:</b> 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.				
<b>UNIT- III: PROCESS</b>				<b>18</b>
<b>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.</b> 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.				
<b>UNIT- IV: SHELL</b>				<b>18</b>
<b>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.</b> 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.				
<b>UNIT- V: SHELL PROGRAMMING</b>				<b>18</b>
<b>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.</b> 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 $\text{sum}=1+1/2+\dots+1/n$ . 6. Write a shell program to check whether a given string is palindrome or not.				
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
	<b>60</b>		<b>30</b>	<b>90</b>
<b>TEXT</b>				
1. Sumitabha Das, “Unix and Shell Programming”, Tata McGraw Hill Publications, Fifth Edition, 2009, New Delhi.				
<b>REFERENCES</b>				
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).				
<b>E REFERENCES</b>				
1. NPTEL, Prof. Sorav Bansal, IIT Delhi, “Operating System”.				
2. NPTEL, Prof. P.C.P.Bhatt, IISc Bangalore, “Operating System”.				

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 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	<i>Explain</i> the functionalities of Enterprise resource planning
CO2	C	Understanding	<i>Characterize</i> the ERP implementation procedures
CO3	C	Knowledge	<i>Describes</i> the elements of ERP
CO4	C	Understanding	<i>Differentiate</i> the available ERP packages
CO5	C	Understanding	<i>Summarize</i> the models of ERP with other related technologies

COURSE CODE	COURSE NAME	L	T	P	C
XCA504A	ENTERPRISE RESOURCE PLANNING	4	1	0	5
C:P:A = 5:0:0					
		L	T	P	H
PREREQUISITE	DBMS, Programming	4	1	0	5
UNIT -I :INTRODUCTION					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 Electrical 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	<i>Understand</i> various image file formats and attributes
CO2	P	Set	<i>Working</i> with various images for different manipulations
CO3	C	Knowledge	<i>Understand</i> painting and color options and tools
CO4	P	Set	<i>Design</i> various invitations, posters and logo
CO5	P	Set	<i>Design</i> a brochure, card and website

COURSE CODE	COURSE NAME	L	T	P	C
<b>XCA601</b>	<b>INTRODUCTION TO GRAPHICS DESIGN</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>
<b>C:P:A = 1:1:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
PREREQUISITE	Basic Concepts of Programming, Design	<b>1</b>	<b>0</b>	<b>2</b>	<b>3</b>
<b>UNIT -I: IMAGE AND FILE FORMATS</b>					<b>5</b>
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.					

<b>UNIT- II: INTRODUCTION TO GIMP</b>			<b>5</b>
Introduction to Vector Shapes and Bitmaps- Exploring the GIMPEnvironment- Using the file Browser Basic Photo Corrections			
<b>UNIT- III: WORKING WITH SELECTION TOOLS</b>			<b>5</b>
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.			
<b>Lab:</b>			<b>30</b>
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			
		<b>LECTURE</b>	<b>PRACTICAL</b>
		<b>15</b>	<b>30</b>
		<b>TOTAL</b>	
		<b>45</b>	
<b>TEXT BOOKS</b>			
1. Beginning GIMP: From Novice to Professional, Akkana Peck, Paper Back, Second Edition, 2008 2. Adobe Photoshop CC Bible, Lisa DaNaeDayley, Brad Dayley, 2014			
<b>REFERENCES</b>			
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	<i>Knowledge</i> on .Net Technologies basic controls and events
CO2	C	Understand	<i>Knowledge</i> on Object Oriented Programming with C#
CO3	C	Understand	<i>Understand</i> and <i>implement</i> VB.Net
CO4	C	Understand,	<i>Apply</i> and <i>Implement</i> C#.Net and VB.Net using various tools
	P	Apply	
CO5	C	Understand,	<i>Understand</i> Framework and threads
	P	Apply	

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
<b>UNIT- I:INTRODUCTION TO .NET TECHNOLOGIES</b>					<b>18</b>
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.					
<b>UNIT- II: INTRODUCTION TO C#</b>					<b>18</b>
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					
<b>UNIT- III: INTRODUCTION TO VB.NET</b>					<b>18</b>
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					
<b>UNIT- IV: APPLICATION DEVELOPMENT ON .NET</b>					<b>18</b>
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 adapter – 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	<i>Describe</i> the medium access control layers
CO2	C	Understand	<i>Characterize</i> the wireless transmission technologies
CO3	C	Knowledge	<i>Describe</i> the mobile network layer and IP packet delivery
CO4	C	Understand	<i>Comprehend</i> TCP and the transmission mobile transport layer
	A	Originate	<i>Characterizing</i> mobile transport layer
CO5	C	Understand	<i>Summarize</i> the WAP and its applications

COURSE CODE	COURSE NAME	L	T	P	C
XCA603A	MOBILE COMPUTING	4	1	0	5
C:P:A = 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. <a href="http://nptel.ac.in/video.php?subjectId=117102062">http://nptel.ac.in/video.php?subjectId=117102062</a>					

	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
<b>XCA602</b>	<b>Project Work</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>6</b>
<b>C:P:A = 0:3:2</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>1</b>	<b>8</b>	<b>9</b>

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
<b>CO 1</b>	3	3	2	2	2	2	2	3	3
<b>CO 2</b>	3	3	2	2	2	2	2	3	3
<b>CO 3</b>	3	3	2	2	2	2	2	3	3
<b>CO 4</b>	3	3	2	2	2	2	2	3	3
<b>CO 5</b>	3	3	2	2	2	2	2	3	3
<b>Total</b>	15	15	10	10	10	10	10	15	15
<b>Course</b>	3	3	2	2	2	2	2	3	3

## YCA101- DATABASE MANAGEMENT SYSTEMS

### Course Outcomes:

CO1	C	Knowledge	<i>Describe</i> the database architecture and its application
CO2	C	Understand	<i>Describe</i> about the relational model and algebra
CO3	C	Understand	<i>Explain</i> the data model and accessing of data.
CO4	C	Knowledge	<i>Describe</i> the normalization concept for a table of data
CO5	C	Understand	<i>Illustrate</i> 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-Data 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-Data 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 (1NF, 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, New Delhi.
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	<i>Define</i> various methods of topology
CO2	C	Understand	<i>Understand</i> and apply layer protocol
CO3	C	Understand	<i>Illustrate</i> various counting and inclusion theory
CO4	C	Understand	<i>Describe</i> LAN concepts
CO5	C	Understand	<i>Explain</i> 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 - relationship 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.

	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>60</b>	<b>15</b>	<b>75</b>

### **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.Tannebaum, 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
<b>UNIT- I: Object modeling</b>					<b>12</b>
Object modelling: Objects and classes - Links and associations - Generalization and inheritance.					
<b>UNIT- II: Grouping constructs</b>					<b>12</b>
Grouping constructs - Aggregation - Generalization as extension and restriction -Multiple inheritance - Meta data - candidate keys - Dynamic modelling: Events and states Nesting – Concurrency					
<b>UNIT – III: Functional modeling</b>					<b>12</b>
Functional modelling: Data flow diagrams - Specifying operations - Analysis: Object modelling - Dynamic modelling - functional modelling - Adding operations - Iteration.					
<b>UNIT- IV: System design and object design</b>					<b>12</b>

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, 3rd 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	<i>Discuss</i> about DSS concept and components
CO2	C	Understand	<i>Describe</i> the data and model management for DSS
CO3	C	Knowledge	<i>Describe</i> about various DSS functionality
CO4	C	Understand	<i>Understand</i> the concept of DSS Interface and Group discussion
CO5	C	Understand	<i>Describe</i> 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
<b>UNIT- I: Introduction</b>					<b>09</b>
Introduction to the concept of Decision Support System - Components of DSS - Dialogue Management					
<b>UNIT –II: Decision Support System</b>					<b>09</b>
Data Management and Model Management for DSS - Examples of different type of DSS - Systems Analysis and Design for DSS					
<b>UNIT – III: DSS functionality</b>					<b>09</b>
Models in the context of DSS - Algorithms and Heuristics - DSS Applications in different functions					
<b>UNIT- IV:Interface and Group Discussion</b>					<b>09</b>
Design of interfaces in DSS - An overview of DSS generators - Group Decision in Support Systems (GDSS) and Decision Conferencing.					
<b>UNIT -V :Introduction of Expert Systems</b>					<b>09</b>
Introduction of Expert Systems - Expert Systems in Management - Case Study on Expert System - Introduction to GIS - MSS based on GIS - Case Studies; Executive Information Systems (EIS).					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>0</b>	<b>45</b>	

### TEXT

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	<i>Discuss the basic fundamentals of statistics and measures</i>
CO2	C	Understand	<i>Identify the concept of sampling technique</i>
CO3	C	Knowledge	<i>Describe about the charts and analysis</i>
CO4	C	Understand	<i>Discuss about the statistics analysis</i>
CO5	C	Understand	<i>Describe the various implementation</i>

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	<b>Build</b> the concept of DBMS programming and its fundamental
CO2	P	Guided response	<b>Build</b> an application program using concepts
CO3	P	Apply Guided Response	<b>Develop</b> an application program using a data model <b>Develop</b> the query technical processing in database managements
CO4	P	Guided response	<b>Explain</b> and <b>Implement</b> 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 | <i>Practice</i> the basic Computer generation of random numbers                       |
| CO2 | A | Apply           | <i>Understand</i> and apply set theory and Relations                                  |
| CO3 | P | Guided Response | <i>Describe</i> various counting and inclusion theory                                 |
| CO4 | A | Apply           | <i>Apply</i> frequency charts for large data sets                                     |
| CO5 | A | Apply           | <i>Apply</i> 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	<i>Explain</i> the operating system functions
CO2	C	Understand	<i>Implement</i> the process and various process scheduling algorithms
CO3	C	Knowledge	<i>Outline</i> process cooperation and inter process communication
CO4	C	Understand	<i>Describe</i> various memory management concepts
CO5	C	Understand	<i>Implement</i> and <i>understand</i> 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
<b>UNIT I OVERVIEW OF OPERATING SYSTEMS</b>					<b>15</b>
Functionalities and objectives of operating Systems- processor register- instruction execution- interrupts- types of interrupts.					
<b>UNIT II PROCESS MANAGEMENT</b>					<b>15</b>
Process concepts: process states- process control block- process and threads- processor scheduling- scheduling algorithms.					
<b>UNIT III PRINCIPLES OF CONCURRENCY</b>					<b>15</b>
Critical Sections - Mutual Exclusion - Process Cooperation- Inter Process Communication- Deadlock Prevention- Detection- Avoidance- Semaphores- Monitors-Message Passing.					
<b>UNIT IV MEMORY MANAGEMENT</b>					<b>15</b>
Virtual Memory Concepts- Paging and Segmentation- Address Mapping- Virtual Storage Management- Page Replacement Strategies.					
<b>UNIT V FILE ORGANIZATION</b>					<b>15</b>
Blocking and buffering, file descriptor- file and directory structures- I/O devices- disk scheduling.					
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
	<b>60</b>	<b>15</b>	<b>-</b>	<b>75</b>	

**TEXT**

3. William Stallings, Operating Systems , Prentice Hall of India (P) Ltd, 7<sup>th</sup> edition-2012.
4. Abraham Silberschatz, 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”, 7<sup>th</sup> 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](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  | <i>Describe</i> various methods to define lifecycle models.         |
| CO2 | C | Understand | <i>Understand</i> and analyse the software inspections              |
| CO3 | C | Knowledge  | <i>Describe</i> and <i>apply</i> various software tools             |
| CO4 | C | Understand | <i>Describe</i> and <i>solve</i> issues in modern GUI               |
| CO5 | C | Understand | <i>Understand</i> 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. Kassem Saleh, "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 and 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

3. Robert L Kruse: Data Structures and program designing using C, 2013.
4. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005
5. M.A.Weiss, “Data Structures and Problem Solving using Java”, 4th Edition, Addison Wesley, 2009.
6. D. Samanta, “Classic Data Structures”, 2nd Edition, PHI, 2009.
7. 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	<i>Practice the basics</i> scheduling algorithms
CO2	A	Apply	<i>Understand</i> and apply algorithms to avoid dead lock
CO3	P	Guided Response	<i>Practice the</i> various page replacement algorithms
CO4	A	Apply	<i>Apply</i> the algorithms for optimal page replacement
CO5	A	Apply	<i>Apply</i> 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	<i>Manipulate</i> various methods to define CASE tools
CO2	P	Set	<i>Developing</i> Relational databases
CO3	P	Guided Response	<i>Describe</i> and <i>implement</i> various Application development tools
CO4	P	Set	<i>Describe</i> and <i>solve</i> problems in developing application software
CO5	P	Guided Response	<i>Developing</i> Management tools

Course Code	Course Name	L	T	P	C
YCA206	Case Tools Lab	0	0	4	2
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
					<b>60</b>
<p>The lab sessions will have experiments on the following:</p> <ol style="list-style-type: none"> <li>1. Use of diagramming tools for system analysis, such as Turbo analyst, for preparing Data Flow diagrams and E-R diagrams.</li> <li>2. Use of tools for relational database design such as relational Designer.</li> <li>3. Identify Use Cases and develop the Use Case model.</li> <li>4. Identify the conceptual classes and develop a domain model with UML Class diagram</li> <li>5. Draw relevant state charts and activity diagrams.</li> <li>6. Use of tools such as Power Builder, Delphi, Magic etc. in developing application software including interactive data-entry screens,</li> <li>7. Transaction processing</li> <li>8. Report Generations, etc.</li> <li>9. Use of tools for managing the process of software development such as Source Code Control System (SCCS).</li> <li>10. Revision Control System (RCS), Make etc.</li> </ol>					
<p><b>References</b></p> <p>Products manuals from concerned vendors</p> <p>Kernighan, B.W., Pike, R., 'The Unix Programming Environment', Prentice Hall of India, New Delhi, 1984.</p>					
		<b>LECTURE</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
		<b>0</b>	<b>60</b>	<b>60</b>	

	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	<i>Describe</i> various methods to define AI techniques
CO2	C	Understand	<i>Understand</i> and apply set theory and Relations
CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various counting and Predicate Logic
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in Probabilistic reasoning
CO5	C	Understand	<i>Understand</i> 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
<b>UNIT –I: AI Techniques</b>					<b>12</b>
AI techniques-search knowledge, abstraction- natural language processing- vision and speech processing- Games-theorem proving- robotics - expert systems.					
<b>UNIT -II : State Space Search</b>					<b>12</b>
State space search: Production systems- Search space control: Depth first, breadth first search, heuristic search - Hill climbing - best first search - branch and bound.					
<b>UNIT- III: Predicate Logic</b>					<b>12</b>
Minimax search: Alpha-Beta cut offs- Predicate Logic : Skolemizing queries - Unification. Modus pone - Resolution - dependency directed backtracking					

<b>UNIT- IV: Backtracking</b>			<b>12</b>
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.			
<b>UNIT- V: Expert Systems</b>			<b>12</b>
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.			
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>60</b>	<b>0</b>	<b>60</b>
<b>TEXT</b>			
1. Stuart J.Russell and Peter Norvig., "Artificial Intelligence- A Modern Approach", Pearson-3 <sup>rd</sup> edition, 2010.			
<b>REFERENCES</b>			
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	<i>Describe</i> various methods to define line-drawing algorithms
CO2	C	Understand	<i>Understand</i> and apply 2d and 3d transformations
CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various types multimedia applications
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in development tools
CO5	C	Understand	<i>Understand</i> 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 Kiran Thakrar , 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	<i>Describe</i> various methods to define simplex method
CO2	C	Understand	<i>Understand</i> and apply branch and bound method.
CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various queuing theory
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in inventory theory
CO5	C	Understand	<i>Understand</i> PERT and CPM path.

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
<b>UNIT- I: Introduction to Optimization Techniques</b>					<b>12</b>
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.					
<b>UNIT- II: Integer Programming</b>					<b>12</b>
Sensitivity analysis transportation problem and its solution - assignment problem and its solution by Hungarian method- Gomorra cutting plane methods - Branch and Bound method					

<b>UNIT- III: Queuing Theory</b>			<b>12</b>
Characteristics of queuing systems - steady state Mimi, MIMit/K and MIMIC queueing models- Replacement of items that deteriorate - Replacement of items that fail Group replacement and individual replacement.			
<b>UNIT- IV: Inventory Theory</b>			<b>12</b>
Costs involved in inventory problems - single item deterministic models-economic lot size models without shortages and with shortages having production rate infinite and finite.			
<b>UNIT- V: PERT and CPM</b>			<b>12</b>
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.			
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>60</b>	<b>0</b>	<b>60</b>
<b>TEXT</b>			
1. Hamdy A.TAHA., "Operations research- An Introduction", 8 <sup>th</sup> edition, Pearson Education, Inc, 2007.			
<b>REFERENCES</b>			
1. Karnbo, N.S., "Mathematical Programming Techniques", McGraw Hill, New York. 1985.			
2. Kanti Swarup, 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 Meyer W.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:**

- CO1    P    Guided                      *Manipulate* various methods to define AI techniques  
               Response
- CO2    P    Set                                *Starts* and apply set theory and Relations
- CO3    P    Guided                      *Develop* and *implement* various counting and Predicate Logic  
               Response
- CO4    P    Guided                      *Develop* and *solve* problems in Probabilistic reasoning  
               Response
- CO5    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
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>
					<b>45</b>
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	<i>Manipulate</i> various methods to define simplex method
CO2	P	Set	<i>Starts</i> and apply branch and bound method.
CO3	P	Guided Response	<i>Develop</i> and <i>implement</i> various queuing theory
CO4	P	Guided Response	<i>Develop</i> and <i>solve</i> problems in inventory theory

COURSE CODE	COURSE NAME	L	T	P	C
YCA305	Optimization Techniques Lab	0	0	4	2
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
					<b>60</b>
To develop computer programs for the following and to test with suitable numerical examples					
<ol style="list-style-type: none"> <li>1. Graphical method to solve two dimensional Linear Programming Problem.</li> <li>2. Revised Simplex method to solve n-dimensional Linear Programming Problem</li> <li>3. Dual Simplex method to solve n-dimensional Linear Programming Problem.</li> <li>4. Solution of Transportation problem.</li> <li>5. Gomory cutting plane methods for Integer Programming Problems</li> </ol>					



<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

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

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

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

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

<b>COURSECODE</b>	<b>COURSE NAME</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>YCA401</b>	<b>Research Methodology(Paper Publications)</b>	0	0	3	3
<b>C:P:A = 0:3:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		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	<i>Explain</i> the concepts of data mining
CO2	C	Understand	<i>Describe</i> and <i>implement</i> the concept of association rule mining
CO3	C	Understand	<i>Describe</i> and <i>implement</i> the concept of classification and clustering the datasets .
CO4	C	Understand	<i>Describe</i> and <i>implement</i> various types data warehouse tools
CO5	C	Understand	<i>illustrate</i> 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 Micheline Kamber, 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. Usama M.Fayyad et. 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\\_Data\\_mining.pdf](https://www.tacoma.uw.edu/sites/default/files/sections/InstituteTechnology/TCSS555_Data_mining.pdf)

2. [http://www.kdnuggets.com/data\\_mining\\_course/syllabus.html](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	<i>Describe</i> various methods to define Source of <i>investment information</i>
CO2	C	Understand	<i>Understand</i> and apply set <i>Interest Rates</i>
CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various <i>Shares and Valuation</i>
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in <i>Portfolio Theory</i>
CO5	C	Understand	<i>Understand</i> Concept of learning the <i>Mutual Funds</i>

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
<b>UNIT- I:Investment Information-Introduction</b>					<b>9</b>
Source of investment information -Valuation of debt securities: Debt prices and interest rate risk-Default risk and purchasing power risk.					
<b>UNIT- II:Interest Rates</b>					<b>9</b>
Market interest rates - term structure of interest rates- Valuation of warrants-convertibles-Option pricing models.					
<b>UNIT- III: Shares and Valuation</b>					<b>9</b>
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