PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

PERIYAR MANIAMMAI
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
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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 Software engineering

DEPARTMENT OF SOFTWARE ENGINEERING

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

1. List of courses for the programmes in order of

S. No.	Programme Name
i.	B.Sc Computer Science
ii.	B.Sc Animation and Multimedia
iii.	B.Sc Artificial Intelligence
iv.	M.Sc Computer Science
v.	M.Sc Software Engineering

2. Syllabus of the courses as per the list.

Legend :

Words highlighted with **Blue Color** - Entrepreneurship

Words highlighted with **Red Color** - Employability

Words highlighted with **Green Color** - Skill Development

Name of the Course	Course Code	Year of introduction	Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development
B.Sc Computer Science			
2022-23 ACADEMIC YEAR			
Basic English Communication Skills	XGL101	2020-21	**Skill development**- Group Discussion , Spoken and Written communication training ,
Ariviyal Tamil/ Comprehensive English	XGL102A/ XGL102B	2019-20	**Skill development:**-Group Discussion , Spoken and Written communication
Programming Methodologies	XBC103	2020-21	**Employability :** Seminar, Quiz , Assignment , Case Study ,
Algebra, Calculus & Analytical Geometry	XBC104	2019-20	**Skill development:** -Solving the real world problem by mathematically
Computer Fundamentals	XBC105	2019-20	**Employability** Seminar, Quiz , Assignment , Case Study , **P**roject Work,
Human Ethics, Values, Rights, and Gender Equality	XUM106	2019-20	**Skill development** -Paper Presentation, poster
Advanced English Communication Skills	XGL201	2020-21	**Skill development:**-Improving communication skill to handle the problems
Data Structures	XBC203	2020-21	**Employability:** Seminar, Quiz , Assignment , Case Study ,
Discrete Mathematics	XBC204	2019-20	**Skill development:** Solving the real world problem by mathematically
Digital Electronics	XBC205	2019-20	**Employability:** Seminar, Quiz , Assignment , Case Study ,
Multimedia Systems	XBC301	2020-21	**Employability:** Seminar, Quiz , Assignment , Case Study ,
Operating System	XBC302	2020-21	**Employability:** Seminar, Quiz , Assignment , Case Study ,
Algorithms	XBC303	2021-22	**Employability:** Seminar, Quiz , Assignment , Case Study ,
Allied Physics	XBC304	2019-20	**Skill development :**Understand the basics of Physics concepts
R Programming	XBC306	2020-21	**Employability:**Seminar, Quiz , Assignment , Case Study , Project
Object Oriented Programming	XBC401	2020-21	**Employability : Seminar, Quiz , Assignment , Case Study**

Database Management Systems	XBC402	2020-21	**Employability : Seminar, Quiz , Assignment , Case Study**
Statistics	XBC403	2020-21	**Employability:** Seminar, Quiz , Assignment , Case Study
Principles of Management	XBC404	2020-21	**Employability:** Seminar, Quiz , Assignment , Case Study
Angular JS	XBC406	2020-21	**Employability:** Seminar, Quiz , Assignment , Case Study
Python Programming	XBC501C	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
Computer Networks	XBC502D	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
.NET Technologies	XBC503A	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
Internet Technologies	XBC504B	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
IPT 21 Days	XBC505	2020-21	**Employability**: Improving programming skill of students
Web Technologies	XBC601A	2021-22	**Employability:** Seminar, Quiz , Assignment , Case Study
Internet of Things	XBC602A	2021-22	**Employability:** Seminar, Quiz , Assignment , Case Study
Machine Learning	XBC603A	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
Project Work	XBC604	2021-22	**Employability**: Improving programming skill of students
B.Sc Animation and Multimedia			
2022-23 – ACADEMIC YEAR			
Basic English Communication Skills	XGL101	2018-19	**Employability:** Q&A with Expert, GD, One Minute Off-the-Cuff
Ariviyal Tamil/ Comprehensive English	XGL102A/ XGL102B	2015-16	**Employability:** Paper Presentation, poster
Foundation Art	XAM103	2021-22	**Employability:** Drawing, poster
Principles of Animation	XAM104	2015-16	**Employability:** Animation Project
Introduction to Computer Graphic Design	XAM105	2021-22	**Employability: D**igital Art, Info graphics

Human Ethics, Values, Rights, and Gender Equality	XUMA106	2014-15	**Employability:** Paper Presentation, poster
Advanced English Communication Skills	XGL201	2020-21	**Employability:** Improving communication skill
Entrepreneurship Development	XVM203	2015-16	Employability: Seminar, Quiz , Assignment , Case Study
Vector Graphics	XAM203	2021-22	Employability: Seminar, Quiz , Assignment , Case Study
Digital Photography	XAM204	2018-19	**Employability:** Digital Art, Info graphics
Basics of Clay Modeling	XAM205	2015-16	**Skill development:** Drawing a model, info graphics, digital art
Audio & Video Editing	XAM301	2015-16	Skill Development : Editing works
Multimedia	XAM302	2022-23	Employability: Seminar, Quiz , Assignment , Case Study
Character & Environment Sketching	XAM303	2015-16	**Skill Development :** Sketching
2D Animation	XAM304	2016-17	**Employability:** Animation Project
Digital Matte Painting	XAM306	2019-20	**Employability:** short films
Script Writing and Story Board Designing	XAM401	2016-17	**Skill Development :** Script Writing
Compositing Techniques	XAM402	2016-17	**Employability**
3D Animation	XAM403	2016-17	**Employability :** 3D Models
Fundamentals of Cinematography	XAM404	2018-19	**Employability :**effects Project
Online Content Creation	XAM406	2022-23	**Skill development:-**Group Discussion , Spoken and Written communication
Web Design	XAM501	2016-17	**Employability:** Claymation Project
3D Modeling	XAM502 A	2016-17	**Employability :** 3D Models
Script Writing and Story Board Designing	XAM503A	2016-17	**Skill Development :** Script Writing

Media Technologies	XAM504B	2016-17	**Employability**
Stop Motion Animation	Minor Course	2019-20	**Skill Development**
Digital Television Production	XAM601	2016-17	**Employability :** Project
3D Animation	XAM602	2016-17	**Employability :** Animation Projects
Film Making	XAM603 A	2016-17	**Employability :** Projects
Texturing& Shading	XAM604 B	2020-21	**Employability :** Posters
Project Work	XAM604	2016-17	**Employability :** Projects
B.Sc Artificial Intelligence			
2022-23 – ACADEMIC YEAR			
Basic English Communication Skills	XGL101	2022-23	**Skill development**- Group Discussion , Spoken and Written communication training ,
Ariviyal Tamil / Comprehensive English	XGL102A/ XGL102B	2022-23	**Skill development:**-Group Discussion , Spoken and Written communication
Programming Methodologies	XAI103	2022-23	**Employability :** Seminar, Quiz , Assignment , Case Study ,
Algebra, Calculus & Analytical Geometry	XAI104	2022-23	**Skill development: -**Solving the real world problem by mathematically
Principles of statistics	XAI105	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
Principles of statistics Lab	XAI105P	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
Human Ethics, Values, Rights, and Gender Equality	XUM106	2022-23	**Skill development -**Paper Presentation, poster
Tamil – II / Foundation Tamil-II	XGT201	2022-23	**Skill development:-**Group Discussion , Spoken and Written communication
English – II	XGE202	2022-23	**Skill development:-**Group Discussion , Spoken and Written communication
Data Structures	XAI203	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
Discrete Mathematic	XAI204	2022-23	**Skill development:** Solving the real world problem by mathematically

Python Programming	XAI205	2022-23	**Employability:** Seminar, Quiz , Assignment , Case Study
Data Structures Lab	XAI206	2022-23	**Employability**: Improving programming skill of students
Python Programming Lab	XAI207	2022-23	**Employability**: Improving programming skill of students
M.Sc Computer Science			
2022-23 – ACADEMIC YEAR			
Advanced Operating System	YCS101	2021-22	Employability: Seminar, Quiz , Assignment , Case Study
Internet of Things	YCS102	2021-22	**Employability:** Seminar, Quiz , Assignment , Case Study
Advanced Computer Architecture	YCS103	2021-22	**Employability:** Seminar, Quiz , Assignment , Case Study
Advanced Database Management System	YCS104	2021-22	**Employability:** Seminar, Quiz , Assignment , Case Study
Web Technologies	YCS105	2021-22	Employability: Seminar, Quiz , Assignment , Case Study
Virtual and Augmented reality	YCS201	2021-22	Employability: Seminar, Quiz , Assignment , Case Study
Advanced Java Programming	YCS202	2021-22	**Employability:** Seminar, Quiz , Assignment , Case Study , Project
Machine Learning	YCS203	2021-22	Employability: Seminar, Quiz , Assignment , Case Study
Artificial Intelligence	YCS204C	2021-22	Employability: Seminar, Quiz , Assignment , Case Study
Pervasive Computing	YCS205C	2021-22	Employability: Seminar, Quiz , Assignment , Case Study
Deep Learning	YCS301	2022-23	Employability: Seminar, Quiz , Assignment , Case Study
Wireless Networks	YCS302	2022-23	Employability: Seminar, Quiz , Assignment , Case Study
Big Data and Analytics	YCS303	2022-23	Employability: Seminar, Quiz , Assignment , Case Study
Block Chain Management	YCS304C	2022-23	Employability: Seminar, Quiz , Assignment , Case Study
Natural Language Processing	YCS305B	2022-23	Employability: Seminar, Quiz , Assignment , Case Study

Project Work	YCS401	2022-23	**Employability**: Improving programming skill of students
Mobile Application Development	YSE901	2013-14	Employability: Seminar, Quiz , Assignment , Case Study
Cyber Security	YSE902	2017-18	Employability: Seminar, Quiz , Assignment , Case Study
Software Reliability	YSE903	2022-23	Employability: Seminar, Quiz , Assignment , Case Study
Usability Engineering	YSE904	2022-23	Employability: Seminar, Quiz , Assignment , Case Study
Internet of Things	YSE905	2017-18	**Employability:** Seminar, Quiz , Assignment , Case Study
Project Phase I	YSE906	2011-12	Employability: Seminar, Quiz , Assignment , Case Study
Project Phase II	YSE1001	2011-12	Employability: Seminar, Quiz , Assignment , Case Study

Syllabus - B.Sc Computer Science

XGL101			BASIC ENGLISH COMMUNICATION SKILLS	L	T	P	SS	C
				2	0	0	2	2
C	P	A		L	T	P	SS	H
				2	0	0	2	4
2	0	0						

COURSE OUTCOMES:		Domain	Level
CO1	***Recall*** the basic grammar and using it in proper context	Cognitive	Remembering
CO2	***Explain*** the process of listening and speaking	Cognitive	Understanding
CO3	***Adapt*** important methods of reading	Cognitive	Creating
CO4	***Demonstrate*** the basic writing skills	Cognitive	Understanding

SYLLABUS		HOURS
UNIT I	**Grammar**	
i. Major basic grammatical categories ii. Notion of correctness and attitude to error correction		9
UNIT II	**Listening and Speaking**	
iii. Importance of listening skills iv. Problems of listening to unfamiliar dialects v. Aspects of pronunciation and fluency in speaking vi. Intelligibility in speaking		9
UNIT III	**Basics of Reading**	
vii. Introduction to reading skills viii. Introducing different types of texts – narrative, descriptive, extrapolative		9
UNIT IV	**Basics of Writing**	
ix. Introduction to writing skills x. Aspects of cohesion and coherence xi. Expanding a given sentence without affecting the structure xii. Reorganizing jumbled sentences into a coherent paragraph xiii. Drafting different types of letters (personal notes, notices, complaints, appreciation, conveying sympathies etc.)		9

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
30	0	0	30	60

Text books

1. Acevedo and Gower M (1999) Reading and Writing Skills. London, Longman 2. Deuter, M et.al. (2015). Oxford Advanced Learner's Dictionary of English (Ninth Edition). New Delhi, OUP

3. Eastwood, John (2008). Oxford Practice Grammar. Oxford, OUP

4. Hadefield, Chris and J Hadefield (2008). Reading Games. London, Longman 5. Hedge, T (2005). Writing. Oxford, OUP

6. Jolly, David (1984). Writing Tasks: Stuidents' Book. Cambridge, CUP

7. Klippel and Swan (1984). Keep Talking. Oxford, OUP

8. Saraswati, V (2005). Organized Writing 1. Hyderabad, Orient Blackswan

9. Swan, Michael. (1980). Practical English Usage. Oxford, OUP

10. Walter and Swan (1997). How English Works. Oxford, OUP

Table 1: Mapping of Cos with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO2	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO3	1	0	0	0	0	0	1	0	1	0	0	0	0	0
CO4	2	0	0	0	0	0	1	0	1	0	0	0	0	0
Total	7	0	0	0	0	0	6	0	4	0	0	0	0	0
Scaled Value	2	0	0	0	0	0	2	0	1	0	0	0	0	0
	1	0	0	0	0	0	1	0	1	0	0	0	0	0

1-5= 1, 6-10 = 2, 11-15= 3

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

Table 2: Mapping of COs with GAs:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	0	0	0	0	0	0	0	1	1	2	0	0
CO2	0	0	0	0	0	0	0	0	0	2	0	0
CO3	0	0	0	0	0	0	0	0	0	1	0	0
CO4	0	0	0	0	0	0	0	0	0	0	1	0
Total	0	0	0	0	0	0	0	1	1	5	2	0
Scale	0	0	0	0	0	0	0	1	1	1	1	0

1-5= 1, 6-10 = 2, 11-15= 3

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

XGL102 A			அறிவியல்தமிழ	L	T	P	C
				3	0	0	3
C	**P**	**A**		**L**	**T**	**P**	**H**
2.9	**0.1**	**0**		**3**	**0**	**0**	**3**

PREREQUISITE: Nil

	COURSE OUTCOMES	**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize(அடையாளம் காணுதல்)***பல்வேறுஅறிவியல் துறைசார்ந்தநூட்பங்கள்,கலைச் சொல்லாக்கஉத்திகள் போன்றவற்றைத் தமிழ்மொழி மூலம் அறிந்துகொள்ளல்.	Cognitive	Remember
CO2	***Choose (தெரிவுசெய்தல்)***வடமொழிவேர்ச்சொற்கள்,புவியியல்,நிலவியல் பற்றிப் பழந்தமிழ் இலக்கியங்கள் மூலம் அறிந்துகொள்ளல்.	Cognitive	Remember

CO3	***Describe(விளக்குதல்)***தொல்காப்பியம் மூலம் அறிவியல் செய்திகளைஉணர்தல்.	Cognitive Psychomotor	Understand Set
CO4	***Apply (பயன்படுத்துதல்)***பல்வேறுகல்வித்துறைசார்ந்தபிரிவுகள்,பல்வேறுகல்வித்துறைசார்ந்தபிரிவுகள் குறித்துதெளிவுபெறல்.	Cognitive	Apply
CO5	***Analyze(பகுத்தல்)***அறிவியல் சிறுகதைகளின் தோற்றம் மற்றும் வளர்ச்சிநிலைநாடகங்களின் பங்குகுறித்துதெளிவுபெறுதல்.	Cognitive	Analyze

அலகு– 1	**அறிவியல்தமிழ் அறிமுகம்**	**9**

அறிவியல்தமிழ் - பொறியியல்,தொழில்நுட்பம்,மருத்துவம்,உழவியல். தமிழில் அறிவியல் - தமிழில் நுட்பம். படைப்புப் பணி–சொல்லாக்கஉத்திகள் - நுட்பமானவேறுபாடுகளைஉணர்ந்துசொல்லாக்கம் செய்தல் - கலைச்சொற்கள் - இந்தியமொழிகளுக்குப் பொதுவானகலைச் சொற்களைஉருவாக்குதல் - வடமொழிவேர்ச்சொற்களைமிகுதியாகக் கொண்டிருத்தலைப் பயன்படுத்துதல்.

அலகு– 2	**பிறஅறிவியல் துறைகள்**	**9**

புவியியல்,நிலவியல் பற்றிபழந்தமிழ் இலக்கியம் குறிப்பிடும் தகவல்கள் - தொல்காப்பியம் குறிப்பிடும் உயிரியல்,மண்ணியல் பற்றியஅடிப்படைச் செய்திகள் - தமிழ் மருத்துவக் கல்வி - அறிவியல் தமிழுக்கு இதழியல் உத்திகள் - வளர் தமிழ்.

அலகு– 3	**பல்வேறுகலைகளில் அறிவியல்**	**9**

மொழியியல் கல்வி–கட்டடக் கலைக்கல்வி–சமுதாயக்கல்வி–சேய்மைக்கல்வி–மண்ணியல்,புவியியல்,கணக்கியல் ஆகியவைஇணைந்தகல்வி - இக்காலக் கல்விப் பொதுநிலை–கலை,அறிவியல் - என்பவற்றின் விளக்கங்கள்.

அலகு– 4	**அறிவியல் தமிழில் சிறுகதைகளின் பங்கு**	**9**

சிறுகதை -இலக்கணம் உருவாக்கும் உத்திகள் - சிறந்தசிறுகதைகள் - சிறுகதை வகைகள் - நல்லசிறுகதைஉருவாக்கம் - வரலாறு–சமூகம் - மொழிபெயர்ப்புமற்றும் அறிவியல் சிறுகதைகள்.

அலகு–5	**அறிவியல் தமிழில் நாடகங்களின் பங்கு**	**9**

நாடகம் - நாடக இலக்கணம், இருவகைநாடகங்கள் - படிப்பதற்குரியநாடகம் - நடிப்பதற்குரியநாடகம் - சரித்திரநாடகம்,சமூகநாடகம் - நகைச்சுவைநாடகங்கள் - அமெச்சூர் நாடகங்கள் - தொழில்முறைநாடகங்கள்.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	**---**	**---**	**45**

மேற்பார்வைநூல்கள்:

1. அறிவியல் தமிழ் - டாக்டர் வா.செ. குழந்தைச்சாமி
2. வளர் தமிழ் - இதழ்கள்
3. இலக்கியவரலாறு–சிறுகதைபற்றியது
4. இலக்கியவரலாறு–புதினம்பற்றியது

Table 1: CO Versus PO mapping.

B.Sc. A & M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1		1							
CO2		1							
CO3		1					1		
CO4	1	2	2	1		1	2		
CO5	2	2	2	2		1	2		
Total	3	7	4	3		2	5		
Scaled Value	1	1	1	1			1		

1 – 5 -> 1 6 – 10 ->2 11 – 15 -> 3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XBC103			PROGRAMMING METHODOLOGIES	L	T	P	SS	C
				3	1	1	1	6
C	P	A		L	T	P	SS	H
2.5	1	0.5		3	1	3	1	8

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Recognize*** the importance of developing simple algorithms and flow charts to solve a problem.	Cognitive Psychomotor	Remember Perception
CO2	***Identify*** the needs problem solving skills coupled with top down design principles.	Cognitive Psychomotor	Understand Perception
CO3	***Demonstrate*** the strategies of array processing algorithms coupled with iterative methods.	Cognitive Psychomotor Affective	Apply Perception Receive
CO4	***Illustrate*** the concept of Structures application development.	Cognitive Psychomotor Affective	Apply Mechanism Respond
CO5	***Develop*** and ***Establish***searching techniques and use of pointers. recursive techniques in programming	Cognitive Psychomotor	Create Origination

UNIT I	INTRODUCTION TO PROGRAMMING	9+3+9

Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies, Introduction to C++ Programming - Basic Program Structure In C++, Variables and Assignments, Input and Output, Selection and Repetition Statements.

Lab:

Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following:

a. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.

UNIT II	FUNCTIONS	9+3+9

Top-Down Design, Predefined Functions, Programmer -defined Function, Local Variable, Function Overloading, Functions with Default Arguments, Call -By-Value and Call-By-Reference Parameters, Recursion.

Lab:

Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following :

b. Learn how to use functions and parameter passing in functions, writing recursive programs.

UNIT III	ARRAYS	9+3+9

Introduction to Arrays, Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi-Dimensional Arrays.

Lab:

Write Programs to learn the use of strings and string handling operations.

1. Problems which can effectively demonstrate use of Arrays. Structures and Union.

UNIT IV	STRUCTURES	9+3+9

Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures, Unions

Lab :

1. Write programs using pointers

UNIT V	FILES AND SEARCHING ALGORITHMS	9+3+9

Declaration and Initialization, Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions. Searching Algorithms - Linear Search, Binary Search. Use of files for data input and output. merging and copy files.

Lab:

1.Write programs to use files for data input and output.

2.Write programs to implement search algorithms.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	45	15	105+15

TEXT BOOKS

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.
2. Programming and problem solving with C++: brief edition, N. Dale and C. Weems, Jones & Bartlett Learning, 2010.

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1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
2. Aho A.V. J.E. Hopcroft and J.D. Ullman., 2001. “The Design and Analysis of Computer Algorithms”, Pearson Education Delhi. Second Edition.

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http://cse02-iiith.vlabs.ac.in/
http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106104128
http://www.nptel.ac.in
http://www.vlab.co.in

Table 1: Mapping of Cos with POs.

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	2	2	2				2	1
CO2	1			2				2	
CO3	1		2	1					
CO4	2	1	2	3				2	1
CO5	2		1	3				2	

Total	8	3	7	11				8	2
Scaled Value	2	1	2	3				2	1

1 -- 5 →1, 6 -- 10 → 2, 11--15 →3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

XBC104			**ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY**	L	T	P	SS	C
				4	1	0	1	6
C	**P**	**A**		L	T	P	SS	H
4	0	0		4	1	0	1	6

PREREQUISITES	Basics of Mathematics	
COURSE OUTCOMES		**DOMAIN** / **LEVEL**
CO1	Evaluate the derivatives of given functions	Cognitive / Understand
CO2	Calculate the definite and indefinite integrals using various techniques.	Cognitive / Understand, Remember
CO3	Apply basic operations on matrices to find the inverse of a matrix	Cognitive / Understand, Apply
CO4	Solve problems using Binomial, exponential and logarithmic series expansions.	Cognitive / Understand
CO5	Calculate the distance between two points and explain section formulae, slope form and intercept form.	Cognitive / Understand

UNIT I – DIFFERENTIAL CALCULUS **12+3**

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 – Leibnitz theorem.

UNIT II – INTEGRAL CALCULUS **12+3**

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 **12+3**

Definition and types of matrices – Matrix Operation – Determinants – Solution of system of linear equations by Matrix method.

UNIT IV – SERIES **12+3**

Binomial theorem for a rational index – Exponential and Logarithmic series – Summation of the above series.

UNIT V – TWO-DIMENSIONAL ANALYTICAL GEOMETRY **12+3**

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	SELF STUDY	PRACTICAL	TOTAL
60	15	15	0	75+15

TEXT BOOKS

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

2. S.Naravanan, T.K.ManicavachagamPillay, S.Vishvanathan, Calculus volume I & IIPrinters

and Publishers Pvt., Ltd, Chennai 1991.
REFERENCES
1. P.Kandasamy&K.Thilagavathi, B.Sc Mathematics for branch I – Vol I &Vol II, S.Chand& Co, 2004.
E- REFERENCES
www.nptel.ac.in Advanced Engineering Mathematics, Prof. PratimaPanigrahi, Department of Mathematics, Indian Institute of Technology, Kharagpur.

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	**3**						**2**		
CO2	**3**						**2**		
CO3	**3**						**2**		
CO4	**3**						**2**		
CO5	**3**						**2**		
Total	**15**						**10**		
Scaled Value	**3**						**2**		

1-5→1, 6-10→2, 11-15→3

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

COURSE CODE	**XBC105**	**L**	**T**	**P**	**SS**	**C**
COURSE NAME	**COMPUTER FUNDAMENTALS**	**3**	**1**	**1**	**1**	**6**
PREREQUISITES	**Nil**	**L**	**T**	**P**	**SS**	**H**
C:P:A	**3:1:0**	**3**	**1**	**3**	**1**	**8**

COURSE OUTCOME		**Domain**	**Level**
CO1	***Recognize*** the importance of computer system, application and practice in Libre Office (FOSS) Writer.	Cognitive Psychomotor	Understand Origination
CO2	***Identify*** and ***define*** basic terms and concepts in computer hardware and peripheral devices and Libre Office (FOSS) Impress.	Cognitive Psychomotor	Understand Origination
CO3	***Establish*** the relationship between hardware and software. ***Arrange*** data and Apply formula in Libre Office (FOSS) Calc.	Cognitive Psychomotor	Apply Origination
CO4	***Identify*** the IO devices. ***Design*** database using Libre Office (FOSS) Base.	Cognitive Psychomotor	Remembrance Origination
CO5	***Identify*** flowchart component and ***apply*** in program and design a project using Libre Office (FOSS).	Cognitive Psychomotor	Understand Apply Origination

UNIT I – INTRODUCTION	**9+3+9**
Introduction – Characteristics of computer – Evolution of computer- Generationof computer –	

classification of computer- The Computer system –Applications of computers

Lab:

Libre Office Writer

Text Processing

Table Creation

Resume Creation

Mail Merge

UNIT II - COMPUTER ARCHITECTURE	**9+3+9**

The Central processing unit (CPU) – Main Memory Unit – Interconnection Unit – Cache – Communication between various units of a computer system.

Lab :

Libre Office Calc

- Worksheet Creation
- Employee Pay Details
- Student Result Sheet
- Simple Charts

UNIT III - PRIMARY AND SECONDARY MEMORY	**9+3+9**

Primary memory : Memory representation – memory hierarchy - Random access memory – Types of Memory – Read only memory – types of ROM – **Secondary Memory** – Classification of secondary storage devices –Magnetic tape – Magnetic disk - Optical disk – Memory stick - Universal serial bus – Mass storage devices

Lab :

Libre Office Impress

- Power Point Preparation
- Create Text And Images With Effects
- Create Animation And Sound Effects

UNIT IV - INPUT AND OUT PUT DEVICES	**9+3+9**

Input devices Types of input devices - Optical character recognition – Optical Mark recognition - Magnetic ink character recognition – Bar code reader – **Output devices** : Types of output - Classification of output devices - Terminals

Lab :

Libre Office Access

- Importing Data From Data Base
- Creating Macro
- Result Processing

UNIT V	**COMPUTER PROGRAM AND LANGUAGES**	**9+3+9**

Computer Program : Developing a program - Algorithm – flow chart - decision table – program testing and debugging- Program documentation – Programming paradigms - Characteristics of good program – **Computer languages** : Evolution of programming language – Classification of programming Language – Generation of a programming language – features of a good programming language

Lab :

Libre Office Project

- Creating A Greeting Card
- Creating A Cover Page Of A Project

LECTURE	**TUTORIAL**	**PRACTICAL**	**Self-Study**	**TOTAL**
45	**15**	**45**	**15**	**105+15**

Text books

Dorling Kindersley, 2009. Introduction to Computer Science ITL Education Solutions Limited fourth Edition.
References:
1. Roger Hunt and John Shelly, penguin Edition,2007. Computers and common sense, (PHI) 2. Internet for everyone, Lenon&Lenon (Lenon Tech World), 2009.
E-References:
3. http://www.nptel.ac.in 4. http://www.vlab.co.in

Mapping of COs with POs

Course Outcomes	Program Outcomes								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**PSO1**	**PSO2**
CO1	2	1	1	1					
CO2			1	1					
CO3	1	2	1	1	1				
CO4	1	2	1	1	1				
CO5	1	1	1	1	2	2		1	
Total	**5**	**6**	**5**	**5**	**4**	**3**		1	
Scaled Value	**1**	**2**	**1**	**1**	**1**	**1**		**1**	

1-5 → 1, 6-10 → 2, 11-15 → 3

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

COURSE CODE	**XUM106**	**L**	**T**	**P**	**SS**	**C**
COURSE NAME	**HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY**	**2**	**0**	**0**	**1**	**0**
PREREQUISITES	**-**	**L**	**T**	**P**	**SS**	**H**
C:P:A	**1.5:0:0.5**	**2**	**0**	**0**	**1**	**3**

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

UNIT I HUMAN ETHICS AND VALUES	**6+3**
Human Ethics and values - 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.	
UNIT IIGENDER EQUALITY	**6+3**
Gender Equality - Gender Vs Sex, Concepts, definition, Gender equity, equality, and empowerment.	

Status of Women in India Social, Economic, Education, Health, Employment, HDI, GDI, GEM. Contributions of Dr.B.R. Ambetkar, ThanthaiPeriyar and Phule to Women Empowerment.

UNIT IIIWOMEN ISSUES AND CHALLENGES **6+3**

Women Issues and Challenges- 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, and Rights to Education, Medical Termination of Pregnancy Act, and Dowry Prohibition Act.

UNIT IV HUMAN RIGHTS **6+3**

Human Rights Movement in India – The preamble to the Constitution of India, Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economic, Social and Cultural Rights, Rights against torture, Discrimination and forced Labor, Rights and protection of children and elderly. 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.

UNIT V GOOD GOVERNANCE AND ADDRESSING SOCIAL ISSUES **6+3**

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	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
30	0	15	0	45

Textbook

1. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
2. Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights, 1998).
3. Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).
4. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
5. Veeramani, K. (ed) Periyar Feminism, (PeriyarManiammai University, Vallam, Thanjavur: 2010).

Reference Books

1. Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).
2. Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).
3. Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).
4. Kaushal, Rachna, Women and Human Rights in India (New Delhi: Kaveri Books, 2000)

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1. http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p
2. http://cvc.nic.in/welcome.html.
3. https://www.transparency.org/
4. https://www.hrw.org/world-report/2015/country-chapters/india

Mapping of COs with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1					2	2	1			

CO2					2	2				
CO3						2				
CO4						2	1			
CO5						3				
Total					4	11	2			
Scaled Value					1	2	1			

1 – 5 → 1, 6-10 → 2, 11 – 15→ 3

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

XGL201			ADVANCED ENGLISH COMMUNICATION SKILLS	L	T	P	SS	C
				2	0	0	0	2
C	P	A		L	T	P	SS	H
1.5	0	0.5		2	0	0	2	4

PREREQUISITE: Nil

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
On the successful completion of this course students would be able to			
CO1	***Recall*** the basic grammar and using it in proper context	Cognitive	Remembering
CO2	***Explain*** the process of listening and speaking	Cognitive	Understanding
CO3	***Adapt*** important methods of reading	Cognitive	Creating
CO4	***Demonstrate*** the basic writing skills	Cognitive	Understanding

UNIT I	**Advanced Reading**	**6**
i. Reading texts of different genres and of varying length ii. Different strategies of comprehension iii. Reading and interpreting non-linguistic texts iv. Reading and understanding incomplete texts (Cloze of varying lengths and gaps; distorted texts.)		
UNIT II	**Advanced Writing**	**6**
v. Analysing a topic for an essay or a report vi. Editing the drafts arrived at and preparing the final draft vii. Re-draft a piece of text with a different perspective (Manipulation exercise) viii. Summarise a piece of prose or poetry ix. Using phrases, idioms and punctuation appropriately		
UNIT III	**Principles of communication and communicative competence**	**6**
x. Introduction to communication – principles and process xi. Types of communication – verbal and non-verbal xii. Identifying and overcoming problems of communication xiii. Communicative competence		
UNIT IV	**Cross Cultural Communication**	**6**
xiv. Cross-cultural communication		

LECTURE	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
30	0	30	0	60

REFERENCES:

1) Bailey, Stephen (2003). Academic Writing. London and New York, Routledge.

2) Department of English, Delhi University (2006). Fluency in English Part II. New Delhi, OUP

3) Grellet, F (1981). Developing Reading Skills: A Practical Guide to Reading Skills. New York, CUP

4) Hedge, T. (2005). Writing. London, OUP

5) Kumar, S and Pushp Lata (2015). Communication Skills. New Delhi, OUP

6) Lazar, G. (2010). Literature and Language Teaching. Cambridge, CUP

7) Nuttall, C (1996). Teaching Reading Skills in a Foreign Language. London, Macmillan

8) Raman, Meenakshi and Sangeeta Sharma (2011). Technical Communication: Principles and Practice. New Delhi, OUP

XES202			ENVIRONMENTAL STUDIES	L	T	P	SS	C
				0	0	0	0	0
C	P	A		L	T	P	SS	H
1.5	0	0.5		2	0	0	1	3

PREREQUISITE : Nil

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Remember Understand
CO2	***Illustrate*** the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.	Cognitive	Understand
CO3	***Identify*** the facts, consequences, preventive measures of major pollutions and ***recognize*** the disaster phenomenon	Cognitive Affective	Remember Receiving
CO4	***Explain*** the socio-economic, policy dynamics and***practice*** the control measures of global issues for sustainable development.	Cognitive	Understand
CO5	the impact of population and the concept of various welfare programs, and ***apply*** themodern technology towards environmental protection.	Cognitive	Understand Apply

UNIT I	**INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY**	**6**

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.

UNIT II	**ECOSYSTEMS AND BIODIVERSITY**	**6**

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.

UNIT III	**ENVIRONMENTAL POLLUTION**	**6**

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.

UNIT IV	**SOCIAL ISSUES AND THE ENVIRONMENT**	**6**

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.

UNIT V	**HUMAN POPULATION AND THE ENVIRONMENT**	**6**

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.

Lecture	**Tutorial**	**Self-Study**	**Practical**	**Total**
30	**0**	**15**	**0**	**45**

Text book

1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.
2. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, 2003

Reference Books

1. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.
2. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.

3. Introduction to International disaster management, Butterworth Heinemann, 2006.
4. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.
5. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, 2009.
6. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
7. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.
8. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, 2003.
9. Sundar, Disaster Management, Sarup& Sons, New Delhi, 2007.
10. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.

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

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	2						2		2	2
CO2	1						2			2
CO3	2	1	2				3		2	3
CO4	2	2	2				2			3
CO5	2				3	3				2
	9	**3**	**4**		**3**	**3**	**9**		**4**	**12**
Scaled value	**2**	**1**	**1**		**1**	**1**	**2**		**1**	**3**

XBC203			**DATA STRUCTURES**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**1**	**1**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**1**	**0**		**3**	**1**	**3**	**1**	**7**

PREREQUISITE: Computer Programming

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Explains*** the concept of data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles	Cognitive Psychomotor	Understand Apply
CO2	***Choose*** To have a knowledge of complexity of basic	Cognitive	Remember

	operations like insert, delete, search on these data structures		
CO3	Ability to choose a data structure to suitably model any data used in computer applications	Cognitive Psychomotor	Apply Set
CO4	Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.	Cognitive	Analyze
CO5	Ability to assess efficiency tradeoffs among different data structure implementations. Implement and know the applications of algorithms for sorting, pattern matching etc.	Cognitive	Create

UNIT I	**INTRODUCTION**	**9+3+ 9**

Basic concepts- Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction Performance analysis, Linear and Non-Linear data structures, Singly Linked Lists-Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists-Operations. Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

Lab

Write program that uses functions to perform the following:

a) Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.

b) Implement the operations, insertion, deletion at a given position in the list and search for an element in the list

c) To display the elements in forward / reverse order

UNIT II	**LINEAR DATA STRUCTURES**	**9+3+ 9**

Stack- Operations, Array and Linked Implementations, Applications- Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation, Queue- Definition and Operations, Array and Linked Implementations, Circular Queues - Insertion and Deletion Operations, Dequeue (Double Ended Queue).

Lab

1. Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion)
2. Write a program to implement queue data structure and basic operations on it (Insertion, deletion, find length) and code at least one application using queues

UNIT III	**TREES**	**9+3+ 9**

Trees, Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees, Priority Queue- Implementation, Heap- Definition, Insertion, Deletion.

Lab

1. Write a program that uses well defined functions to Create a binary tree of elements and Traverse a Binary tree in preorder, inorder and postorder.

UNIT IV	**GRAPHS**	**9+3+ 9**

Graphs, Graph ADT, Graph Representations, Graph Traversals, Searching, Static Hashing- Introduction, Hash tables, Hash functions, Overflow Handling. Sorting Methods, Comparison of Sorting Methods.

Lab

1. Write program that implements linear and binary search methods of searching for an element in a list.

2. Write and trace programs to understand the various phases of sorting elements using the methods.

a) Insertion Sort
b) Quicksort
c) Bubble sort

UNIT V	ALGORITHM DESIGN TECHNIQUES	9+3+ 9

Search Trees- Binary Search Trees, AVL Trees- Definition and Examples.Red-Black and Splay Trees, Comparison of Search Trees, Pattern Matching,Algorithm- The Knuth-Morris-Pratt Algorithm, Tries (examples).

Lab

1. Write and trace programs to Create a Binary search tree and insert and delete from the tree.
2. Represent suitably a graph data structure and demonstrate operations of traversals on it.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	15	45	15	105+15

REFERENCES:

1. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson
3. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
    1. www.tutorialspoint.com
    2. www.nptel.com
    3. www.virtuallab.ac.in
    4. Lecture Slides, Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
    5. Lecture Slides : http://www.mhhe.com/engcs/compsci/forouzan/

COURSE CODE	XBC204	L	T	P	SS	C
COURSE NAME	DISCRETE MATHEMATICS	3	1	0	2	6
PREREQUISTE	NIL	L	T	P	SS	H
C:P:A	3:0:0	3	1	0	2	6

Course Outcome		Domain	Level
CO1	***Define*** the properties and laws of sets, relations and functions and***Apply*** the operation of the sets using venDiagram.	Cognitive	R, Ap
CO2	***Apply***the concepts of logic and to find the normal forms. ***Explain*** the tautologies and Contradiction.	Cognitive	U, Ap
CO3	***Apply*** the counting principle permutation and combination and to ***solve*** the problem. ***Explain*** the pigeonhole principle.	Cognitive	U, Ap
CO4	***Explain*** the types of lattices and to***show*** lattices as partially ordered sets.	Cognitive	U, Ap
CO5	***Apply*** **the** properties of semi groups and groups and Explain any set with binary operation as a semigroup and group with examples.	Cognitive	U, Ap

UNIT I	12

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	**12**
Statements - Normal forms – CNF – DNF – PCNF - PDN – Tautologies - Contradictions.	

UNIT III	**12**
Counting principles – The Pigeonhole principle – Counting – Permutations and Combinations – Combinatorial arguments – Countable and uncountable sets.	

UNIT IV	**12**
Lattices as partially ordered set – Types of lattices – Lattices as algebraic system.	

UNIT V	**12**
Binary operations – Semi groups - Groups – Examples and elementary properties.	

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**15**	**0**	**30**	**60 + 30**

TEXT BOOK

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. Dr.M.K.Venkataraman, Dr.N.SridharanN.Chandrasekaran, "Discrete Mathematics", the National Publishing Company, 2003.
3. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics", 10th edition,Tata McGraw Hill Companies,2010.

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1. www.nptel.ac.in
2. Graph Theory A NPTEL Course S.A. Choudum.
3. Graph Theory by Prof. L. Sunil Chandran Computer Science and Automation Indian Institute of Science, Bangalore.

Mapping of CO's with PO's:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	**3**	**1**				**1**		**1**
CO2	**3**	**1**	**1**			**1**		**1**
CO3	**3**		**1**			**1**		**1**
CO4	**3**					**1**	**1**	**1**
CO5	**3**					**1**	**1**	**1**

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XBC205	**DIGITAL ELECTRONICS**	**L**	**T**	**P**	**SS**	**C**
		3	1	1	1	6

C	P	A		L	T	P	SS	H
2.5	0.5	0.5		3	1	3	1	8

PREREQUISITE: NIL

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Know*** the numerical values in various number systems and perform number conversions between different number systems.	Cognitive	Understand
CO2	***Demonstrate*** the operation of logic gates, Boolean algebra including algebraic manipulation/simplification, application of DeMorgan's theorems and Karnaugh map reduction method.	Cognitive Psychomotor	Understand Apply
CO3	***Identify, Analyze*** and ***Design*** combinational circuits	Cognitive Psychomotor	Understand Apply
CO4	***Analyze*** and ***Design*** sequential digital circuits like flip-flops, registers, counters	Cognitive Psychomotor	Understand Apply
CO5	***Explain*** the architecture of the Intel 8085microprocessor for its various applications and ***Understand*** 8085 instruction set and develop simple programmes and practice.	Cognitive	Understand

UNIT I	**NUMBER SYSTEMS AND MINIMIZATION TECHNIQUES**	**9+3+9**

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD – 2421 - Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another- Logic Gates : AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR- Implementations of Logic Functions using gates, NAND –NOR implementations.

Lab : Logic gates – verification

UNIT II	**BOOLEAN ALGEBRA & SIMPLIFICATION**	**9+3+9**

Boolean Algebra – Basic Theorems and properties – Boolean Functions – Canonical and Standard Forms – Karnaugh Map Simplification – Two, ThreeVariables – NAND and NOR Implementation – Don't Care Conditions.

Lab : Application of Boolean functions

UNIT III	**COMBINATIONAL CIRCUITS**	**9+3+9**

Combinational Circuits – Adder - Subtractor – Design and Analysis procedures – Binary Parallel Adder – Decimal Adder – Encoder – Decoder – Multiplexer – Demultiplexer – Magnitude comparators – Read Only Memory (ROM) – Programmable Logic Array(PLA).

Lab : Applications of combinational circuits.

UNIT IV	**SEQUENTIAL CIRCUIT**	**9+3+9**

Sequential circuits – Latches – Flip-flops – Triggering of Flip-Flops – Analysis of clocked sequential circuits – State reduction and state assignment – Design procedure of clocked sequential circuits – Design of counters – Registers – Shift registers – Ripple counter and Synchronous counter.

Lab: Design and verify the circuits of Flip Flops, Registers and counters.

UNIT V	**MEMORIES**	**9+3+9**

Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM – EEPROM –EAPROM –Programmable Logic Devices.

Lab : Verification of timing waveforms.

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF- STUDY**	**TOTAL**
45	**15**	**45**	**15**	**105+15**

TEXT BOOK

1. M. Morris Mano, "Digital Design", 3rd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. John .M Yarbrough, "Digital Logic Applications and Design", Thomson- Vikas publishing house, New Delhi, 2002.
3. Microprocessor Architecture Programming and Application, Ganonker, Ramesh, PHI Learning, New Delhi.

REFERENCES:

1. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", 2nd Edition, Vikas Publishing House Pvt. Ltd New Delhi, 2004
2. Charles H.Roth. "Fundamentals of Logic Design", Thomson Publication Company, 2003.
3. Donald P.Leach and Albert Paul Malvino, "Digital Principles and applications", 5th Edition., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.

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1. www.tutorialspoint.com/computer_logical_organization/pdf/quick_guide.pdf
2. www.vlab.co.in/ba_labs_all.php?id=1
3. www.nptel.ac.in/video.php?subjectId=117105080
4. https://www.youtube.com/watch?v=CeD2L6KbtV

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

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

		L	T	P	SS	C

			0	**0**	**0**	**0**	**0**
C	P	A	**L**	**T**	**P**	**SS**	**H**
2.75	0	0.25	**3**	**0**	**0**	**0**	**3**

PREREQUISTE: XES202

Course Outcomes		Domain	Level
CO1	***Understand*** and ***Recognize*** the concepts of disaster	Cognitive	Understand Remember
CO2	***Recognize and describe*** the causes and effects of disaster	Cognitive	Understand Remember
CO3	***Describe*** the various approaches of risk reduction	Cognitive	Remember
CO4	***Demonstrate*** the inter-relationship between disaster and development	Cognitive	Understand
CO5	Discuss hazard and vulnerability profile of India and respond to drills related to relief	Cognitive Affective	Remember Response

UNIT - I	**INTRODUCTION TO DISASTERS**	**6**

Concepts and definitions- Disaster, Hazard, Vulnerability, Resilience, Risks

UNIT - II	**DISASTERS: CLASSIFICATION, CAUSES, IMPACTS**	**12**

Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, pandemics, complex emergencies, Climate change

UNIT - III	**APPROACHES TO DISASTER RISK REDUCTION**	**10**

Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.

UNIT - IV	**INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT**	**6**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

UNIT - V	**DISASTER RISK MANAGEMENT IN INDIA**	**11**

Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).
The project / fieldwork to understand vulnerabilities work on reduction of disaster risk and build a cultural safety.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	**0**	**0**	**0**	**45**

TEXT BOOKS:

1. Coppola P Damon, “Introduction to International Disaster Management, Butterworth-Heinemann, 2015
2. K. N. Shastri, “Disaster Management in India”, Pinnacle Technology, 2012
3. Gupta Anil K, Sreeja S. Nair, “Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Lee Allyn Davis, “Natural Disasters”, Infobase Publishing, 2010
5. Andharia J, “Vulnerability in Disaster Discourse”, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008

REFERENCES:

1. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
2. Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.

E- RESOURCES:

1. NIDM Publications at http://nidm.gov.in- Official Website of National Institute of Disaster Management (NIDM), Ministry of Home Affairs,
2. http://cwc.gov.in , http://ekdrm.net , http://www.emdat.be ,
3. http://www.nws.noaa.gov , http://pubs.usgs.gov , http://nidm.gov.ini
4. http://www.imd.gov.in

Mapping of CO with GA

COs	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA1	GA11	GA12
CO1	1					3	2	1				1
CO2	1					3	2	1				1
CO3	1					3	2	1				1
CO4	1					3	2	1				1
CO5	1					3	2	1				1
Total	**5**					**15**	**10**	**5**				**5**
Scaled value	**1**					**3**	**2**	**1**				**1**

XBC301			**MULTIMEDIA SYSTEMS**	**L**	**T**	**P**	**SS**	**C**
				3	0	1	0	4
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**1**	**0**		3	0	2	0	5

PREREQUISITE:XBC103

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Identify*** and ***describe*** the Multimedia components, various html tags, Image editing open source software tools	Cognitive	Understand
CO2	***Create*** webpage with necessary image document (text) and animation and practice in HTML.	Cognitive Psychomotor	Understand Application Set
CO3	Gain a working knowledge and ***develop*** their skills in editing and altering photographs.	Cognitive	Understand Application
CO4	Students can ***renovate*** the damaged photos. And export the files with various formats and printing devices.	Cognitive Psychomotor	Understand Analyze

			Set
CO5	Students can ***draw*** and ***develop*** short clips and banners with animation using flash and create Audio files. Using html image editing and 2D animation software, can ***develop*** and ***deploy*** a complete web site in internet.	Cognitive Psychomotor	Understand Create Set

UNIT I	**MULTIMEDIA SYSTEMS DESIGN**	**9+6**

Introduction – Multimedia applications and its impact – Multimedia System Architecture – Network architecture for multimedia. Evolving technologies for Multimedia–HDTV-UDTV-3D technologies and digital signal processing. Defining objects for Multimedia systems-Text-image – Audio and Video, Audio-recording

Lab Experiments Using Image Editing Tools

UNIT II	**IMAGE EDITING –BASICS**	**9+6**

Introduction about Image Editor- Navigating - Menus and panels-**Working with Images**-Zooming &Panning an Image-Working with Multiple Images, Rulers, Guides & Grids- Undoing Steps with History- Adjusting Color with the New Adjustments Panel-The New Masks Panel - The New Note Tool & the Save for Web & Devices Interface- The New Auto-Blend & Auto-Align Layers Commands- The New 3D Commands-**Resizing & Cropping Images**- Understanding Pixels & Resolution-The Image Size Command-Interpolation Options-Resizing for Print & Web-Cropping & Straightening an Image- Adjusting Canvas Size & Canvas Rotation.

Lab Experiments Using Image Editing Tools

UNIT III	**IMAGE AND TEXT EDITING- LAYERS**	**9+6**

Layers -Background Layer- Creating, Selecting, Linking & Deleting Layers- Locking &Merging Layers-Copying Layers, Using Perspective & Layer Styles- Filling & Grouping Layers-Introduction to Blending Modes-Blending Modes, Opacity & Fill Creating & Modifying Text

Lab Experiments Using Image Editing Tools

UNIT IV	**IMAGE AND TEXT EDITING- EFFECTS**	**9+6**

Photo Retouching -The Red Eye Tool-The Clone Stamp Tool- The Patch Tool & the Healing Brush Tool-**Color Correction**: -Adjusting Levels-Adjust Curves-**Creating Special Effects**- Getting Started with Filters-Creating Text Effects- Applying Gradients to Text-**Exporting**- Saving with Different File Formats-Saving for Web & Devices-Printing Options

Lab Experiments Using Image Editing Tools

UNIT V	**2D ANIMATION**	**9+6**

Exploring the 2D environment – working with images - basic drawing and selection – shapes – color – text – layers – scene and frame label – symbol and instance – animation

Lab Experiments Using 2D Animation Tools

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF- STUDY**	**TOTAL**
45	**-**	**30**		**75**

TEXT BOOK

1.Prabat K Andleigh and KiranThakrar, "Multimedia Systems and Design", PHI Resent, 2003.
2.R.Lavanya, HTML 5, Ane Books Pvt. Ltd, 2011"
3.JudithJeffcoate, "Multimedia in practice technology and Applications", PHI,1998.

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1.Adobe Photoshop CS 2 - One on One (2005 edition) by Deke McClelland
Macromedia Flash MX 2004: The Complete Reference by Brian Underdahl

2.Foley, Vandam, Feiner, Huges, 2003. “Computer Graphics: Principles & Practice”, Pearson Education, second edition .
3. PhotoShopCS for digital photographers by Colin Smith Publisher: Charles River Media. 1st edition .
4. ActionScript for Flash MX: The Definitive Guide, 2nd Edition By Colin Moock.

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1. https://www.youtube.com/watch?v=ZGXS5HoBYAQ
2. https://www.youtube.com/watch?v=spoJ7Z8LzW8
3. www.tutorialspoint.com/listtutorials/multimedia/1
4. http://www.vlab.co.in

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	2	2	2	2	1	1	2	2
CO2	2	3	2	1	1	1	1	2	2
CO3	2	2	3	1	2	1	1	3	2
CO4	2	3	1	1	1	1	1	2	2
CO5	2	1	1	2	2	1	1	2	2
Average	2	2	2	1	2	1	1	2	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XBC302			OPERATING SYSTEMS	L	T	P	SS	C
				4	1	0	1	6
C	P	A		L	T	P	SS	H
4	0	0		4	1	0	1	6

PREREQUISITE	Computer Fundamentals

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Identifying*** the important computer system resources and the role of operating system in their management policies and algorithms.	Cognitive	Remember
CO2	Ability to explain the process scheduling algorithms and Calculate scheduling problems	Cognitive	Understand Apply
CO3	Ability to ***express various***process synchronization issues.	Cognitive	Understand Apply
CO4	Indicate the memory management techniques and importance of file system.	Cognitive	Understand
CO5	*Classify* functionality and have sound knowledge of various types of operating system android.	Cognitive	Understand

UNIT I	INTRODUCTION TO OPERATING SYSTEM	12+3

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

UNIT II	PROCESS CHARACTERIZATION	12+3

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process

and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Pre-emptive Scheduling Algorithms.

UNIT III	INTER PROCESS COMMUNICATION AND SYNCHRONIZATION	12+3

Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery. Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

UNIT IV	MEMORY MANAGEMENT	12+3

Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory. (File and I/O Management, OS security) Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Security Policy Mechanism, Protection, Authentication and Internal Access Authorization.

UNIT V	INTRODUCTION TO ANDROID OPERATING SYSTEM	12+3

Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.

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

Text book

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education ,1997.
4. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992

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1. NPTEL Evidence, 2009. *IISc Bangalore*. [Online] Available at:
2. http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html
3. http://nptel.iitg.ernet.in/Comp_Sci_Engg/IISc%20Bangalore/Operating%20Systems.htm

CO Versus PO mapping.

B.Sc CS	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1						2
CO2	2	1	2	2			2		2
CO3	2	2	1				2		3
CO4	2	2	1						
CO5	2	1				1			1
Total	11	8	5	2		1	2		8
Scaled Value	3	2	1	1		1	1		2

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

XBC303	ALGORITHMS	L	T	P	SS	C

				3	1	1	1	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.8	**1**	**0.2**		3	1	3	1	**7**

PREREQUISITE: XBC105

COURSE OUTCOMES		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Recognize***to learn good principles of algorithm design.	Cognitive Psychomotor	Remember Perception
CO2	***Identify*** and ***Achieve*** to learn how to analyses algorithms and estimate their worst -case and average- case behavior (in easy cases);	Cognitive Psychomotor	Understand Set
CO3	***Illustrate*** and ***practice*** to become familiar with fundamental data structures and with the manner in which these data structures can best be implemented;	Cognitive Psychomotor	Apply Guided Response
CO4	***Demonstrate*** To learn how to apply their theoretical knowledge in practice (via the practical component of the course).	Cognitive Psychomotor	Apply Mechanism
CO5	***Develop*** and ***Maintain***Advanced Analysis Technique	Cognitive Psychomotor	Create Complete Overt

UNIT I	**INTRODUCTION**	**9+3+9**

Introduction: Basic Design and Analysis Techniques of Algorithms, Correctness of Algorithm. Algorithm Design Techniques: Iterative Techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.

Lab

1. Write a test program to implement Divide and Conquer Strategy. Eg: Quick sort algorithm for sorting list of integers in ascending order
2. Write a program to implement Merge sort algorithm for sorting a list of integers in ascending order.

UNIT II	**SORTING AND SEARCHING TECHNIQUES**	**9+3+9**

Elementary Sorting techniques– Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques- Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques- Medians & Order Statistics, complexity analysis.

Lab

1. Write program to implement the DFS and BFS algorithm for a graph.
2. Write program to implement backtracking algorithm for solving problems like N-queens.

UNIT III	**GRAPHS ALGORITHMS**	**9+3+9**

Graphs Algorithms: Graph Algorithms– Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees. String Processing

Lab

1. Write a program to implement the backtracking algorithm for the sum of subsets problem.
2. Write program to implement greedy algorithm for job sequencing with deadlines.

UNIT IV	**LOWER BOUNDING TECHNIQUES**	**9+3+9**

Lower Bounding Techniques: Decision Trees, Balanced Trees, Red-Black Trees

Lab

1. Write a program to implement Dijkstra's algorithm for the Single source shortest path problem.

2. Write a program that implements Prim's algorithm to generate minimum cost spanning tree.
3. Write a program that implements Kruskal's algorithm to generate minimum cost spanning tree

UNIT V	ADVANCED ANALYSIS TECHNIQUE	9+3+9

Advanced Analysis Technique: Randomized Algorithm, Distributed Algorithm, Heuristics.

Lab

1. Write program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
2. Write program to implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	45	15	105+15

TEXT BOOKS:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3rd Edition 2009.
2. Sara basse & A.V. Gelder Computer Algorithm – Introduction to Design and Analysis, Publisher – Pearson 3rd Edition 1999

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1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2007.
2. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Computer Algorithms", Galgotia Publications Pvt. Ltd., 2002
3. A.V. Aho, J.E. Hopcroft and J.D. Ullman "Data Structures and Algorithms" Pearson Education Delhi, 2002

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1. www.tutorialspoint.com
2. www.nptel.com
3. www.virtuallab.ac.inLecture Slides,
4. Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
5. Lecture Slides : http://www.mhhe.com/engcs/compsci/forouzan/

Mapping of COs with Pos

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3				1				
CO2	2	3							
CO3	1	3	3	2	2				
CO4	1	3	3	2	2	3	2		
CO5		3	3	3	2	3	2	2	3
Total	7	12	9	7	7	6	4	2	3
Scaled Value	2	3	2	2	2	2	1	1	1

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

XBC304	ALLIED PHYSICS	L	T	P	SS	C
		4	1	0	1	6

C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**1**	**0**		4	1	0	1	**5**

PREREQUISITE: Students with fundamental physics knowledge in HSC or SSLC level.

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

Course Outcome		**Domain**	**Level**
CO1	***State*** the basics of laser and ***distinguish*** the various laser systems and ***identify*** various optical fiber and source and detector.	**Cognitive**	Knowledge, Analyze
CO2	***Recall the s***emiconductor fundamentals and ***Explain***characterization and applications.	**Cognitive**	Knowledge, Comprehension
CO3	***Know*** the basics of operational amplifier and ***Construct***various oscillators ***Explain*** various applications	**Cognitive, Psychomotor**	Knowledge, Analysis, Set
CO4	***Understand*** the digital and gate principles ***distinguish*** Boolean algebra from algebra.	**Cognitive**	Knowledge
CO5	***Know*** the basics of IC's ***understand***the fabrication methods of IC's	**Cognitive**	Perception, Knowledge

UNIT - I :	**LASER PHYSICS**	**12+3**

Principles of laser– population inversion – meta stable state – conditions for laser actions - Types –Nd-Yag – CO2 laser – Helium – neon laser – applications of lasers.

UNIT - II :	**FIBER OPTICS PHYSICS**	**12+3**

Principle and propagation of light in optical fibers – Numerical Aperture and acceptance angle – Types of optical fibers – Source & detector – LED sensor – Block diagram fiber optics communication system – Applications.

UNIT - III :	**SEMICONDUCTOR PHYSICS**	**12+3**

Semiconductor fundamentals – Properties – Types of semiconductor– Volt – Ampere Characteristics of P-N junction Diode – Zener diode – applications of Zener diodes - Volt – Ampere Characteristics of common emitter NPN transistor, FET, UJT and SCR – Principles of LED and LCD.

UNIT - IV :	**OPERATIONAL AMPLIFIER**	**12+3**

Operational amplifier characteristics – inverting and non-inverting amplifier– adder, subtractor, integrator and differentiator circuits – Wien bridge oscillator – Phase shift oscillators and Twin-T oscillators

UNIT - V :	**INTEGRATED ELECTRONICS**	**12+3**

Basic monolithic ICs – Steps in fabrication of Monolithic IC's – epitaxial growth – masking –etching impurity diffusion fabricating monolithic resistors, diodes, transistors and capacitors – circuit layout – contacts and inter connections– General applications of IC's

LECTURE	**TUTORIAL**	**SELF - STUDY**	**PRACTICAL**	**TOTAL**

60	15	15	0	75+15

TEXT BOOKS:

1.	V.K. Mehta, Principles of Electronics, S.Chand and CompanyLtd., 2009.
2.	Laser Physics – Thiagarajan, Springer
3.	Digital principles and Applications – Malvino& Leech, McGraw Hill Publication 7th edition, 2011.

REFERENCE BOOKS:

1.	Basic Electronics – B.L. Theraja, S Chand & company Ltd, New Delhi.
2.	Fundamentals of digital computers – Bartee, McGraw-Hill.
3.	A. Mottershed, Semiconductor Devices and Applications, New Age Int Pub,

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

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

XBC307			**R PROGRAMMING**	**L**	**T**	**P**	**SS**	**C**
				1	0	0	0	**1**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
0.5	**0.4**	**0.1**		1	0	0	0	**1**

PREREQUISITE: Nil

COURSE OUTCOMES:

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of R	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the knowledge on events and functions of R	Cognitive	Understand
CO3	***Employ*** the understanding of the R and ***Establish***an application programme on their own and actively ***participate*** in the teams for designing various projects	Cognitive Psychomotor Affective	Apply Set Respond

Introduction - History - Features - Setting up path - Working with R - Basic Syntax - Variable and Data Types - Operator - Conditional Statements - Looping - Control Statements - Object -

Functions –Strings- Vector-Lists-arrays-Packages–Dataframes– Database-Visualization

Lab:

Obtaining user data
Using conditionals
Using Random numbers
Using Iteration
Using Vector-Lists-arrays
Using Functions

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
15	0	0	0	15

TEXT BOOKS:

1. Hands-On Programming with R, Garrett Grolemund, O'Reilly Media, Inc, 2014.

REFERENCES:

1. Mastering Predictive Analytics with R, Rui Miguel Forte, 2015 Packt Publishing .

E-REFERENCES:

1. https://www.tutorialspoint.com/r/index.htm
2. https://www.statmethods.net/r-tutorial/index.htm
3. https://www.guru99.com/r-tutorial.html
4. https://www.edureka.co/blog/r-tutorial/

XBC401			OBJECT ORIENTED PROGRAMMING	L	T	P	SS	C
				3	0	1	0	4
C	P	A		L	T	P	SS	H
2.5	1	0.5		3	0	2	0	5

PREREQUISITE: Problem Solving Using C

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize***the concepts of data, abstraction and encapsulation.	Cognitive Psychomotor	Remember Perception
CO2	***Memorize*** the knowledge of classes and objects, packages and write the programs using them.	Cognitive Affective	Understand Receive
CO3	***Develop*** the solution to the Complex problems.	Cognitive	Analyze
CO4	***Implement***good programming design methods for program development using exception and basic event handling mechanisms.	Cognitive Affective	Apply Respond
CO5	***Recognize***the typical object-oriented constructs of specific object-oriented programming language.	Cognitive Psychomotor	Understand Set

UNIT I **INTRODUCTION** **9+6**

Basics: Introduction to Object Oriented Programming and its Basic Features, Basic Components of C++, Characteristics of Object-Oriented Language, Structure of a C++ Program, Flow Control Statements in C++, Functions - Scope of Variables, Inline Functions, Recursive Functions, Pointers to Functions, C++ Pointers, Arrays, Dynamic Memory Allocation and De-Allocation.

Lab :

1. Number of vowels and number of characters in a string.
2. Write a function called zeros maller () that is passed with two introduce arguments by reference and

set the smaller of the number to zero. Write a man() program to access this function.

UNIT II	OBJECT ORIENTED AND PROCEDURE ORIENTED PROGRAMMING	9+6

Differences Between Object Oriented and Procedure Oriented Programming, Abstraction, Overview of Object-Oriented Programming Principles, Encapsulation, C++ Classes, Objects, User Defined Types, Constructors and Destructors, this Pointer, Friend Functions, Data Abstraction, Operator Overloading, Type Conversion.

Lab :

3.Demonstration of array of object.
4. Using this pointer to return a value (return by reference).

UNIT III	INHERITANCE	9+6

Class Inheritance, Base and Derived Classes, Virtual Base Class, Virtual Functions, Polymorphism, Static and Dynamic Bindings, Base and Derived Class Virtual Functions, Dynamic Binding through Virtual Functions, Pure Virtual Functions, Abstract Classes, Virtual Destructors.

Lab:

5.Demonstration of virtual function.
6. Demonstration of static function

UNIT IV	FILE STREAMS	9+6

Stream Classes Hierarchy, Stream I/O, File Streams, Overloading the Extraction and Insertion Operators, Error Handling during File Operations, Formatted I/O.

Lab:

7. Accessing a particular record in a student's file.
8. Demonstration of operator overloading.

UNIT V	EXCEPTION HANDLING	9+6

Exception Handling- Benefits of Exception Handling, Throwing an Exception, the Try Block, Catching an Exception, Exception Objects, Exception Specifications, Rethrowing an Exception, Uncaught Exceptions.

9. Write a program to create a database for students that contains Name, Enrolment no, Department, Programme using Constructors, destructors, input and output functions ; input and output for 10 people using different methods.
10. Create a class holding information of the salaries of all the family members (husband, wife, son, daughter). Using friend functions give the total salary of the family.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	0	30	0	75

TEXT BOOKS

1. Problem solving with C++: The Object of Programming, Walter Savitch, 4th Edition, Pearson Education.
2. C++: The Complete Reference, Herbert Schildt, 4th Edition

REFERENCES

1. Object Oriented Programming with C++, Sourav Sahay, 2nd Edition, Oxford
2. The C++ Programming Language, B. Stroutstrup, 3rd Edition, Pearson Education
3. Programming in C++, Ashok N Kamthane. Pearson 2nd Edition

E-REFERENCE

1. https://www.**tutorials**point.com/cplusplus/
2. www.cprogramming.com/**tutorial**/**c++-tutorial**.html

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	1	1	1	1	2	1	1	1
CO2	3	2	2	2	2	2	2	2	1
CO3	2	2	2	2	3	2	2	2	1
CO4	3	2	2	2	2	2	2	3	1
CO5	3	3	3	3	3	3	3	3	1
Average	3	2	2	2	2	2	2	2	1

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

XBC402			**DATA BASE MANAGEMENT SYSTEM**	**L**	**T**	**P**	**SS**	**C**
				3	1	1	1	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**1**	**0**		3	1	3	1	**8**

PREREQUISITE: Computer Fundamentals

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Recognize*** and***Express*** the fundamentals of Data Base Management System and Relational database system	Cognitive	Remember Understand
CO2	***Recognize*** and***Explain*** theTransaction Management and Storage implementation techniques	Cognitive	Remember Understand
CO3	***Sketch and show*** the Relational data base design for the real time application.	Cognitive Psychomotor	Apply Set
CO4	***Analyze and Apply*** proper Relational data base queries	Cognitive	Analyze Apply
CO5	***Design and Construct*** an application with suitable form design and data base	Psychomotor	Origination

UNIT I	**INTRODUCTION**	**9+3+9**

Basic Database Concepts, Terminology, and Architecture; Types of Database Management Systems. Differences between Relational and other Database Models. Data Modelling: Relations, Schemas, Constraints, Queries, and Updates; Conceptual vs. Physical Modeling; Entity Types, attributes, ER Diagrams.

Lab:

1: E-R Model

Analyze the organization and identify the entities, attributes and relationships in it. .

Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

2: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).

UNIT II	RELATIONAL DATABASES	9+3+9

SQL Data Definition: Specifying Tables, Data Types, Constraints; Simple SELECT, INSERT, UPDATE, DELETE Statements; Complex SELECT Queries, including Joins and Nested Queries; Actions and Triggers; Views; Altering Schemas. Relational Algebra: Definition of Algebra; Relations as Sets; Operations: SELECT, PROJECT, JOIN, etc. Normalization Theory and Functional Dependencies, 2NF, 3NF, BCNF, 4NF, 5NF.

Lab:

3: Relational Model

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion.

4: Normalization

Apply the First, Second and Third Normalization levels on the database designed for the organization

UNIT III	DATABASE DESIGN	9+3+9

Indexing: Files, Blocks, and Records, Hashing; RAID; Replication; Single-Level and Multi-Level Indexes; B-Trees and B+-Trees. Query Processing Translation of SQL into Query Plans; Basics of Transactions, Concurrency and Recovery.

Lab:

5: Installation of Mysql and practicing DDL commands

Installation of MySql. Creating databases, how to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.

6: Practicing DML commands on the Database created for the example organization

DML commands are used to for managing data within schema objects. Some examples:

- SELECT - retrieve data from a database
- INSERT - insert data into a table
- UPDATE - updates existing data within a table
- DELETE - deletes all records from a table, the space for the records remain

UNIT IV	TRANSACTION MANAGEMENT	9+3+9

DATABASE PROGRAMMING: Embedded SQL; Dynamic SQL, JDBC; Avoiding Injection Attacks; Stored Procedures; Lightweight Data Access Layers for Python and JavaScript Applications; PHP and MySQL, Object Relational Modeling: Hibernate for Java, Active Record for Rails.

Lab:

7: Querying

practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

8 and 9: Querying (continued…)

Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

UNIT V	IMPLEMENTATION TECHNIQUES	9+3+9

BIG DATA: Motivations; OLAP vs. OLTP; Batch Processing; MapReduce and Hadoop; Spark; Other Systems: HBase. Working with POSTGRES, REDIS, MONGO, and NEO: Setting up the same Database on Four Platforms; Basic Queries and Reporting.

Lab:

10: Triggers

Work on Triggers. Creation of, insert trigger, delete trigger, update trigger. Practice triggers using the above database

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	15	45	15	105+15

REFERENCES:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, 2011"Database System Concepts", Sixth Edition, Tata McGraw Hill.
2. RamezElmasri, Shamkant B. Navathe., 2008. "Fundamentals of Database Systems", Fifth Edition, Pearson.
3. Raghu Ramakrishnan., 2010. "Database Management Systems", Fourth Edition, Tata McGraw Hill.
4. G.K.Gupta, 2011."Database Management Systems", Tata McGraw Hill.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	0	1	2	0	1	0	0	3	3
CO2	0	1	1	1	0	0	0	1	1
CO3	1	3	1	1	1	0	0	3	3
CO4	1	3	2	1	1	1	1	3	3
CO5	3	3	2	2	1	1	1	3	2
Average	1	2	2	1	1	0	0	3	2

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

XBC403			STATISTICS	L	T	P	SS	C
				4	1	0	1	6
C	P	A		L	T	P	SS	H
3.0	0.5	0.5		4	1	0	1	6

PREREQUISITE: SOME BASIC KNOWLEDGE OF STATISTICS IS REQUIRED

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1:	Explain the statistical data in the form of table, diagram and graph.	Cognitive	Applying
CO2:	Find the measures of central tendency and measures of dispersion and skewness for the given data.	Cognitive Understandi	Applying

		ng	
CO3:	Evaluate correlation coefficient using Karl Pearson's and find the regression line for the given data.	Cognitive	Understanding Applying
CO4:	Solve the problem in the time series using the method of seasonal variation and find the interpolation using Newtons and Lagranges method	Cognitive Psychomotor	Applying Imitation
CO5:	Find the index number using aggregative, relative and cost of living index number method. Define the sampling technique and Apply the concept of test of significance for t, f and chi-square.	Cognitive Affective	Remembering Applying Receiving

UNIT I	**INTRODUCTION**	**12+3**
Introduction - Classification and tabulation of statistical data - Diagrammatic and graphical representation of data.		
UNIT II	**MEASURES OF CENTRAL TENDENCY**	**12+3**
Measures of Central tendency - Mean, Median and Mode - Dispersion, Range, Quartile deviation, Mean Deviation, Standard Deviation - Measures of Skewness.		
UNIT III	**CORRELATION**	**12+3**
Correlation - Karl Pearson's co-efficient of correlation - Spearman's Rank Correlation regression lines and Co-efficient.		
UNIT IV	**TIME SERIES ANALYSIS**	**12+3**
Time series Analysis - Trend - Seasonal variations - Interpolation - Newtons and Lagranges method of estimation.		
UNIT V	**INDEX NUMBERS**	**12+3**
Index numbers - aggregative and relative index - chain and fixed indeed wholesale index - Cost of living index - Sampling Techniques - types of sample and sampling procedure - tests of significance - Normal, t, F, chi -square - Simple Problems.		

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
60	**15**	**0**	**15**	**75+15**

TEXT

1.Statistical methods - S.P. Gupta - S. Chand & Co., New Delhi.

REFERENCES

1. The Fundamentals of Statistics - Elhance. Elhance publication.
2. Business Mathematics and Statistics - Dr. P. R. Vittal - Margham Publications, Chennai.

E REFERENCES

www.nptel.ac.in

Advanced Engineering Mathematics by Prof. Somesh Kumar
Department of Mathematics, Indian Institute of Technology, Kharagpur.

TABLE 1: COs VS GAs Mapping

	GA1	**GA2**	**GA3**	**GA4**	**GA5**	**GA6**	**GA7**	**GA8**	**GA9**	**GA10**

CO 1	3	2		1	1				1	
CO 2	3	2		1					1	
CO 3	3	2		1					1	0
CO 4	3	2		1	1				1	0
CO 5	3	2		1	1				1	0
	15	10	0	5	3	0	0	0	0	5

1 - Low , 2 – Medium , 3- high

XBC404			**PRINCIPLES OF MANAGEMENT**	**L**	**T**	**P**	**SS**	**C**
				4	**1**	**0**	**1**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0.5**	**0.5**		**4**	**1**	**0**	**1**	**6**

PREREQUISITE: Basic principles in an organization.

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Management Principle.	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the understanding of the concept of planning the events in organization.	Cognitive	Understand
CO3	***Employ*** the understanding of the various scheduling activities and actively ***participate*** in terms for the organizing of various events in organization.	Cognitive Affective	Apply Respond
CO4	***Utilize*** the directing effectively in the real-world class room management.	Cognitive	Apply
CO5	***Design*** and ***Establish*** the principles of management concept in day to day activities.	Cognitive Psychomotor	Create Set

UNIT I	**OVERVIEW OF MANAGEMENT**	**12+3**
Definition - Management - Role of managers - Evolution of Management Thought-Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.		
UNIT II	**PLANNING**	**12+3**
Nature and purpose of planning - Planning process - Types of plans –Objectives - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision Decision Making Process - Rational Decision-Making Process - Decision Making under differen conditions.		
UNIT III	**ORGANIZING**	**12+3**

Nature and purpose of organizing - Organization structure - Formal and informal groups organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - -Performance Appraisal.		
UNIT IV	**DIRECTING**	**12+3**
Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.		
UNIT V	**CONTROLLING**	**12+3**
Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	15	--	15	75+15

REFERENCES:

1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India,8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.
3. Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.
4. https://www.pearsonhighered.com
5. www.miracleworx.com

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	0	0	1	1	0	0	0	2	2
CO2	0	1	0	1	0	1	1	2	2
CO3	0	2	2	1	1	2	2	2	1
CO4	0	1	1	1	0	1	1	2	2
CO5	0	1	1	1	0	1	1	3	3
Average	0	1	1	1	1	1	1	2	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XBC406	ANGULAR JS	L	T	P	SS	C

			1	0	0	0	1
C	P	A	L	T	P	SS	H
0.5	0.5	0	1	0	0	0	1

PREREQUISITE: Nil

COURSE OUTCOMES:

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1:	***Recognize*** the fundamentals and techniques of Angular JS.	Cognitive	Remember
CO2:	***Express*** the knowledge on Invoking, MVC, Validation, Communication over http, cookies and file upload in AngularJS	Cognitive Psychomotor	Understand Guided Response

Introduction to AngularJS - Invoking Angular - Model View Controller - Formatting Data with Filters - Changing Views with Routes and $location - Validating User Input - Project Organization - Tools - Running Your Application - Testing with AngularJS - Relationship Between Model, Controller, and Template - Communicating Over $http - Directives and HTML Validation - API Overview - Communicating Between Scopes with $on, $emit, and $broadcast - Cookies - Internationalization and Localization - Wrapping a jQueryDatepicker - File Upload in AngularJS

Lab:

1. Create single page web applications using the MVC pattern of AngularJS
2. Understand the programming model provided by the AngularJS framework
3. Define Angular controllers and directives
4. Control Angular data bindings

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
15	0	0	0	15

TEXTBOOKS

1. Brad Green, ShyamSeshadri “AngularJS", O'Reilly Media, 2013.
2. Ken Williamson "Learning AngularJS: A Guide to AngularJS Development" O`reilly Media, 2015.

REFERENCES

Diego Netto,ValeriKarpov Professional AngularJS : A Concise Approach Wiley 2015

E-REFERENCES

1. https://www.w3schools.com/angular/
2. www.tutorialsteacher.com/angularjs/angularjs-tutorials

XBC501C			PYTHON PROGRAMMING	L	T	P	SS	C
				3	0	1	0	4
C	P	A		L	T	P	SS	H
3.5	0.25	0.25		3	0	2	0	5

PREREQUISITE: XBC402

Course Outcomes	Domain	Level
After the completion of the course, students will be able to		

CO1	***Analyze*** Multidimensional Intelligent model from typical system	Cognitive	Analyze
CO2	***Evaluate*** various mining techniques on complex data objects	Cognitive	Evaluate
CO3	***Understand*** Data Mining processes using Open Source Data Mining tool.	Cognitive	Understand
CO4	***Choose*** the appropriate techniques and algorithms for extracting data	Cognitive Affective	Apply Respond
CO5	***Recognize*** the knowledge of data mining, data preprocessing and data warehousing	Cognitive Psychomotor	Analyze Perception

UNIT I	**INTRODUCTION**	**9+6**

Introduction to Python, Python, Features of Python, Execution of a Python, Program, Writing Our First Python Program, Data types in Python. Python Interpreter and Interactive Mode; Values and Types: int, float, boolean, string, and list; Variables, Expressions, Statements, TupleAssignment, Precedenceof Operators, Comments; Modules and Functions, Function Definition and use, Flow of Execution, Parameters and Arguments.

Lab:

1.Write a program to demonstrate different number data types in Python.

2. Write a program to perform different Arithmetic Operations on numbers in Python.

3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

UNIT II	**OPERATORS IN PYTHON**	**9+6**

Operators in Python, Input and Output, Control Statements. Boolean Values and operators, Conditional (if), Alternative (if-else), Chained Conditional (if-else if-else); Iteration: state, while, for, break, continue, pass; Fruitful Functions: Return Values, Parameters, Local and Global Scope, Function Composition, Recursion.

Lab:

4.Write a python script to print the current date in the following format “Fri Oct 11 02:26:23 IST 2019”

5. Write a program to create, append, and remove lists in python.

6. Write a program to demonstrate working with tuples in python.

UNIT III	**ARRAYS IN PYTHON**	**9+6**

Arrays inPython, Strings and Characters. Strings: String Slices, Immutability, String Functions and Methods, String Module; Lists as Arrays. Illustrative Programs: Square Root, gcd, Exponentiation, Sum an Array ofNumbers, Linear Search, Binary Search.

Lab:

7. Write a program to demonstrate working with dictionaries in python.

8. Write a python program to find largest of three numbers.

9. Write a Python program to construct the following pattern, using a nested for loop

```
*
* *
* * *
* * * *
* * * * *
* * * *
```

* * *
* *
*

UNIT IV	FUNCTIONS	9+6

Functions, Lists and Tuples. List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters; Tuples: Tuple Assignment, Tuple as Return Value; Dictionaries: Operations andMethods; Advanced ListProcessing - List Comprehension; Illustrative Programs: Selection Sort, InsertionSort, Merge sort, Histogram.

Lab:

10.Write a Python script that prints prime numbers less than 20.
11. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
12. Write a python program to define a module and import a specific function in that module to another program.

UNIT V	FILES AND EXCEPTION	9+6

Files and Exception: Text Files, Reading andWriting Files, Format Operator; Command Line Arguments, Errors and Exceptions, Handling Exceptions, Modules, Packages; Illustrative Programs: Word Count, Copy File.

Lab:

13.Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
14. Write a Python class to convert an integer to a roman numeral.
15. Write a Python class to reverse a string word by word.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	0	30	0	75

TEXTBOOKS:

1. Mark Lutz, Learning Python
2. Tony Gaddis, starting out with Python
3. Kenneth A. Lambert, Fundamentals of Python

REFERENCES:

1.James Payne, Beginning Python using Python 2.6 and Python 3

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	3	2	2	1	1	1	3
CO2	2	3	2	3	1	1	1	2	3
CO3	3	2	3	2	2	2	1	2	3
CO4	3	2	2	3	1	1	1	1	3
CO5	2	3	2	2	2	2	1	2	3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XBC502D			COMPUTER NETWORKS	L	T	P	C
				4	2	0	6
C	P	A		L	T	P	H
2.8	0	0.2		4	2	0	6

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the importance of computer networks and ***explain*** the network models, media, layering.	Cognitive Psychomotor	Remember Guided
CO2	***Describe*** the functionalities of layer and ***indicate*** the various network connecting devices.	Cognitive	Understand
CO3	***Demonstrate*** the unicast and multicast routing.	Cognitive Psychomotor	Understand Response
CO4	***Match*** and ***Show*** theprotocol for real time applications.	Cognitive Psychomotor	Remember Set
CO5	***Analyze*** the protocols of application layer and ***Design*** a simple network.	Cognitive Psychomotor	Analyze Origination

UNIT I	NETWORK FUNDAMENTALS AND PHYSICAL LAYER	12+6

Introduction – Data Communications – Networks – Network Types – Internet History – Standards and Administration - Network Models – Protocol Layering – TCP/IP Protocol Suite – The OSI Model – Transmission Media – Switching.

UNIT II	DATA LINK LAYER	12+6

Introduction to Data Link Layer – Link Layer Addressing - Error Detection and Error Correction - Data Link Control - MAC – Wired LANs: Ethernet - Wireless LANs – Other Wireless Networks - Connecting Devices and Virtual LANs.

UNIT III	NETWORK LAYER	12+6

Introduction to Network Layer – Network Layer Protocols – Unicast Routing – Multicast Routing.

UNIT IV	TRANSPORT LAYER	12+6

Introduction to Transport Layer – Transport Layer Protocols – User Datagram Protocol – Transmission Control Protocol – SCTP.

UNIT V	APPLICATION LAYER AND SECURITY	12+6

Introduction to Application Layer – Standard Client Server Protocols – Multimedia – WWW and HTTP – FTP – Electronic Mail – TELNET – DNS.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	30	0	0	90

TEXT BOOKS:

1. BehrouzA.Forouzan, “Data Communications and Networking”, Fifth Edition, McGraw Hill Education, 2013.

REFERENCES:

1. Achyut S Godbole, Atul Hahate, “Data Communications and Networks”, Second Edition, New Delhi: Tata McGraw-Hill Education, 2011.

2. Andrew S. Tanenbaum, David J. Wetherall “Computer Networks”, Fifth Edition, Pearson Education Inc., 2013.
3. William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2014.

E-REFERENCES

1. Video Lecture Link: http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html
2. Lecture Slides, Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
3. Lecture Slides: http://www.mhhe.com/engcs/compsci/forouzan/

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	1	0	1	0	1	1
CO2	0	1	3	2	0	2	0	2	2
CO3	1	2	3	0	0	2	0	2	2
CO4	1	2	3	1	0	2	0	1	2
CO5	0	3	0	1	0	2	0	1	2
Average	1	2	2	1	0	2	0	1	2

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

XBC503A			.NET TECHNOLOGIES	L	T	P	SS	C
				3	2	1	0	6
C	P	A		L	T	P	SS	H
2.8	1	0.2		3	2	3	0	8

PREREQUISITE: Nil

COURSE OUTCOMES:

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the basics of .net frame work	Cognitive Psychomotor	Remember Perception
CO2	***Express*** and ***relate*** decision and iteration control structures to implement programs	Cognitive Psychomotor	Understand Perception
CO3	***Predict*** and ***Create*** database connection and ***manipulate*** the data source	Cognitive Psychomotor	Understand Create Guided Response
CO4	***Choose*** and ***Apply*** controls and ***reproduce*** well-structured .NET applications	Cognitive Psychomotor	Remember Apply Guided Response

CO5	***Construct*** and ***demonstrate*** various real-world applications in ASP.NET with C#	Cognitive Psychomotor Affective	Create Mechanism Valuing

UNIT I	**INTRODUCTION TO .NET FRAMEWORK**	**9+6+9**

Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation – Automatic Memory Management- Visual Studio .NET – Using the .NET Framework- The Framework Class Library- .NET objects – ASP .NET - .NET web services – Windows Forms

Lab: 1.Familiarizing with .NET Environment.

UNIT II	**INTRODUCTION TO C#.NET**	**9+6+9**

Variables and constants – data types – declaration. Operators – types – precedence. Expressions. Program flow – Decision statements – Loop statements – Value data types – Structures, Enumerations. Reference data types- Single dimensional – Multi-dimensional arrays – jagged arrays – dynamic arrays Windows programming– creating windows Forms – windows controls –Events. Menus and Dialog Boxes– Creating menus – menu items – context menu – Using dialog boxes – showDialog () method.

Lab: 1. Work with Console
2. Looping and Conditional Statements
3. Working with various Controls such as timer, calendar, etc.,
4. Create basic text editor

UNIT III	**APPLICATION DEVELOPMENT USING ADO .NET**	**9+6+9**

Architecture of ADO.NET – ADO.NET providers – Connection – Command – Data Adapter – Dataset. Accessing Data with ADO.NET - Connecting to Data Source, Accessing Data with Data set and Data Reader - Create an ADO.NET application - Using Stored Procedures.

Lab:
1. Insert, Delete, Update and Modify Operations
2. Store and retrieve data using Data Grids

UNIT IV	**INTRODUCTION TO ASP.NET**	**9+6+9**

ASP.NET Features**:** Change the Home Directory in IIS - Add a Virtual Directory in IIS Set a Default Document for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site. Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding web controls to a Page. Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.

Lab:
1. Working with various Controls
2. Using stored Procedures
3. Form Creation with HTML

UNIT V	**APPLICATIONS OF ASP.NET WITH C#**	**9+6+9**

Windows Application: Creation of Media Player. Web Applications: Job Portal, E-mail and SMS Server, Online food ordering System.

Lab:

1. Real Time Projects

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
45	**30**	**45**	**0**	**120**

TEXTBOOKS

1. David Chappell, “Understanding .NET”, 2nd Edition, Addison-Wesley Professional, 2006.
2. Andrew Troelsen, PhilJapikse , “Pro C# 7 With .NET and .NET Core”, Apress, 2017.
3. Matthew Macdonald, “ASP.NET: The Complete Reference”, McGraw Hill Education, 2017.

REFERENCES

4. Herbert Schildt, “C# 4.0 The Complete Reference”, McGraw-Hill Education, 2010.
5. Marino Posadas, “Mastering C# and .NET Framework”, Packt Publishing, 2016.
3. Paul Deitel and Harvey Deitel, “Visual C# How to Program”, Prentice Hall; Pearson Education Limited; 6th edition (2017).

E-REFERENCES

6. www.tutorialspoint.com
7. www.microsoft.com/net
3. www.w3schools.com/aspnet

COs versus POs mapping

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3				1		1		
CO2	2	2	1	2	3	0	2	1	
CO3	2	3	2	2	3	1	2	2	
CO4	2	3	2	2	3	0	2	2	3
CO5	1	3	3	2	3	1	2	3	2
Total	10	11	8	10	13	2	9	8	5
Scaled Value	2	3	2	2	3	1	2	2	1

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

XBC504B			INTERNET TECHNOLOGIES	L	T	P	SS	C
				4	2	0	0	6
C	P	A		L	T	P	SS	H
2.5	0.5	0		4	2	0	0	6

PREREQUISITE: Computer Networks

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Identify*** the terms related to the Internet and how the Internet is changing the world.	Cognitive Psychomotor	Remember Perception
CO2	***Design***and connected to the Internet and demonstrate the ability to use the World Wide Web	Cognitive	Create
CO3	***Perceive*** the significance electronic mail and other internet-based services.	Cognitive Psychomotor	Create Perception
CO4	***Recognize*** the design principles of the web pages and how they are created.	Cognitive	Create
CO5	***Combine the*** needed internet resources and implement in the business model	Cognitive	Analyze
UNIT I	**INTRODUCTION**		**12+6**

Introduction: Overview, Network ofNetworks, Intranet, Extranet and Internet. World Wide Web, Domain andSub domain, Address Resolution, DNS, Telnet, FTP, HTTP. Review of TCP/IP: Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control.		
UNIT II	**IP DATAGRAM**	**12+6**
IP Datagram, IPv4 and IPv6. IP Subnetting and addressing: Classful and Classless Addressing, Subnetting. NAT, IP masquerading, IP tables. Internet Routing Protocol: Routing -Intra andInter Domain Routing, Unicast and Multicast Routing, Broadcast. Electronic Mail: POP3, SMTP.		
UNIT III	**HTML INTRODUCTION**	**12+6**
HTML: Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Color name, Color value. Image Maps: map, area, attributes ofimage area. Extensible Markup Language (XML): Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts: Introduction, Environment Variable, GET and POST Methods		
UNIT IV	**PERL INTRODUCTION**	**12+6**
PERL: Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling. JavaScript: Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object - string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies: Definition of cookies, Create and Store a cookie with example. Java Applets: Container Class, Components, Applet Life Cycle, Update method; Parameter passing applet, Applications.		
UNIT V	**CLIENT- SERVER PROGRAMMING**	**12+6**
Client-Server programming In Java: Java Socket, Java RMI. Threats: Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks. Network security techniques: Password and Authentication; VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall: Introduction, Packet filtering, Stateful, Application layer, Proxy. Internet Telephony: Introduction, VoIP. Multimedia Applications: Multimedia over IP: RSVP, RTP, RTCP and RTSP. Streaming media, Codec and Plugins, IPTV. mywbut.com Search Engine and Web Crawler: Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.		

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
60	30	-	-	90

REFERENCES:

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI, Learning, Delhi, 2013.
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	1	2	2	1	1	0	0	1	2
CO2	1	3	1	2	2	0	1	2	2
CO3	0	3	1	2	2	1	1	2	2
CO4	0	3	0	2	2	0	1	2	2
CO5	0	3	2	1	3	1	1	3	2
Average	1	2	1	2	2	1	1	2	2

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

XBC601A			WEB TECHNOLOGIES	L	T	P	SS	C
				3	0	1	0	4
C	P	A		L	T	P	SS	H
2	1	0		3	0	2	0	5

PREREQUISITE: Software Engineering

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Web Technology.	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the knowledge on HTML, CSS and JavaScript and PHP in Web Design.	Cognitive	Understand
CO3	***Employ*** the understanding of the Client and Server-side scripts and actively ***participate*** in teams for the creation of static and dynamic web pages.	Cognitive Affective	Apply Respond
CO4	***Utilize*** the web designing tools effectively in the real world applications.	Cognitive	Apply
CO5	***Design*** and ***Establish*** the Website or Web based Software.	Cognitive Psychomotor	Create Set

UNIT I	INTRODUCTION TO WEB TECHNOLOGY & HTML	9+6

Introduction to Web Technology – Concept of Tier – Web Pages – Static Web Pages – Dynamic Web Pages – HTML Basics – HTML CSS – Links – Images – Tables – Lists - Frames - HTML forms and Input tags.

Lab:

1. Formatting tags, ordered list and unordered list.
2.Tables, frame, image map and hyperlink.

UNIT II	CSS & JAVASCRIPT	9+6

CSS Basics – Texts and Fonts – Links, Lists and Tables – Border and Outline – Position – Dimension and Display - Java Script Basics – Functions – Events – Conditional and Looping Statements – Forms.

Lab:

1.Font, color and style
2. Background and Links
3.Form Validation
4.Looping and Conditional Statements

UNIT III	PHP BASIC CONCEPTS	9+6

PHP - Basic Syntax – Data Types – Variables & Constants in PHP - String and Operators - Selective and Iterative flow of controls - PHP arrays & types - PHP function declaration - adding parameters - Server side includes - Built in functions

Lab:

1. Strings and Operators
2.Flow of controls and Arrays

3.PHP Forms
4.PHP Functions

UNIT IV	PHP ADVANCED CONCEPTS	9+6

PHP File Handling - Opening a File - Closing a File - Check End-Of-File - Reading a File Line By Line - Reading File Character By Character - PHP File Upload - Exception Handling - Creating Custom Exception Class - Re-Throwing Exceptions - Cookies - Sessions - E-Mails

Lab:

1.File Handling
2.Exception Handling
3. PHP Sessions and Cookies

UNIT V	PHP & MySQL	9+6

MySQL Database – Connect – Create DB – Create Table – Insert Data – Get Last ID – Insert Multiple - Select Data – Delete Data – Update Data – Limit Data

Lab:

PHP with MySQL

LECTURE	TUTORIAL	PRACTICAL	ELF STUDY	TOTAL
45	0	30	-	75

TEXT BOOKS

1. AchyutS.Godbole, AtulKahate, "Web Technologies TCP/IP To Internet Application Architectures", First Edition, Tata McGraw-Hill Publishing Company Limited, 2003.
2. Elizabeth Castro, Bruce Hyslop, "HTML 5 and CSS 3", Eight Edition, Peachpit Press, 2015.
3. Thomas A. Powell, Fritz Schneider, "JavaScript: The Complete Reference", Second Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2008.
4. Kevin Tatroe, Peter MacIntyre and RasmusLerdorf, "Programming PHP", Third Edition, O'Reilly Media, Inc., 2015.

REFERENCES:

1. N.P. Gopalan, J.Akilandeswari, "Web Technology: A Developer's Perspective", Second Edition, PHI Learning Private Limited, 2014.
2. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2010.

E-REFERENCES:

1.www.php.net/manual/en/intro-whatis.php
2.www.w3schools.com
3.www.tutorialspoint.com

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0

CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

XBC602A			**INTERNET OF THINGS**	**L**	**T**	**P**	**SS**	**C**
				4	**0**	**0**	**2**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0**	**0**		**4**	**0**	**0**	**2**	**6**

PREREQUISITE: Fundamentals of Computer

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Identify*** the components of IOT and learn the basic issues, policy and challenges in the Internet	Cognitive Psychomotor	Remember Perception
CO2	***Design*** the portable device, program the sensors and microcontrollers	Cognitive	Create
CO3	***Perceive*** the significance of ***build***ing the software agents in the real time environments	Cognitive Psychomotor	Create Perception
CO4	***Formulate*** and ***Establish*** the cloud-based communication through wi Fi/ Bluetooth	Cognitive Psychomotor	Create Set
CO5	***Combine the*** needed internet resources and implement in the business model	Cognitive	Analyze

UNIT I	**INTRODUCTION TO IOT, SENSORS AND ACTUATORS**	**12**

Introduction to IoT: Definition, Characteristics, Applications, Evolution, Enablers, Connectivity Layers, Addressing, Networking and Connectivity Issues, Network Configurations, Multi -Homing, Sensing: Sensors and Transducers, Classification, Different Types of Sensors, Errors, Actuation: Basics, Actuator Types- Electrical, Mechanical Soft Actuators

UNIT II	**INTRODUCTION TO NETWORKING**	**12**

Basics ofNetworking, Communication Protocols, Sensor Network, Machine to Machine Communication (IoT Components, Inter-Dependencies, SoA, Gateways, Comparison Between IoT & Web, Difference Protocols, Complexity of Networks, Wireless Networks, Scalability, ProtocolClassification, MQTT& SMQTT, IEEE 802.15.4, Zigbee)

UNIT III	**ARDUINO PROGRAMMING**	**12**

Interoperability in IoT, Introductionto Arduino Programming, Integration Of Sensors And Actuators With Arduino

UNIT IV	**PYTHON PROGRAMMING**	**12**

Introduction toPython Programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Implementation of IoT with Raspberry Pi

UNIT V	**DATA ANALYTICS**	**12**

Data Handling and Analytics, Cloud Computing Fundamentals, Cloud Computing Service Model, Cloud Computing Service Management and Security, Sensor-Cloud Architecture, View and Dataflow. FOG Computing: Introduction, Architecture, Need, Applications and Challenges. Industrial IoT, Case Studies: Agriculture, Healthcare, Activity Monitoring.

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**

60	0	0	30	60+30

TEXT BOOK

1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press).
2. Internet of Things: A Hands-on Approach", by A Bahga and Vijay Madisetti (Universities Press)

REFERENCES:

1. Charalampos Doukas , Building Internet of Things with the Arduino, Create space, April 2002.
2. Dieter Uckelmann et.al, "Architecting the Internet of Things", Springer, 2011Luigi Atzor et.al, "The Internet of Things: A survey, ", Journal on Networks, Elsevier Publications, October, 2010
3. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011
4. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010
5. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
6. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

E-REFERENCES

1. http://postscapes.com
2. http://www.theinternetofthings.eu/what-is-the-internet-of-things

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	1	2	2	1	1	0	0	1	2
CO2	1	3	1	2	2	0	1	2	2
CO3	0	3	1	2	2	1	1	2	2
CO4	0	3	0	2	2	0	1	2	2
CO5	0	3	2	1	3	1	1	3	2
Average	1	2	1	2	2	1	1	2	2

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

XBC603A			MACHINE LEARNING	L	T	P	SS	C
				4	0	0	2	6
C	P	A		L	T	P	SS	H
3	0	0		4	0	0	2	6

PREREQUISITE: Data Mining

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Analyze the*** supervised, unsupervised machine learning approaches	Cognitive	Analyze
CO2	***Understand*** linear algebra concepts.	Cognitive	Understand
CO3	***Understand*** a regression machine learning algorithm for solving a problem.	Cognitive	Understand
CO4	***Choose a****regularization concepts and solve the problem.*	Cognitive	Apply
CO5	***Recognize*** the neural network model	Cognitive	Analyze

UNIT I	INTRODUCTION	12

Concept of Machine Learning, Applications of Machine Learning, Key elements of Machine Learning, Supervised vs. Unsupervised Learning, Statistical Learning: Bayesian Method, The Naive Bayes Classifier.

UNIT II	LINEAR ALGEBRA	12

Software's for Machine Learning and Linear Algebra Overview: Plotting of Data, Vectorization, Matrices and Vectors: Addition, Multiplication, Transpose and Inverse using Available Tool such as MATLAB.

UNIT III	REGRESSION	12

Linear Regression: Prediction using Linear Regression, Gradient Descent, Linear Regression with one Variable, Linear Regression with Multiple Variables, Polynomial Regression, Feature Scaling/Selection. Logistic Regression: Classification using Logistic Regression, Logistic Regression vs. Linear Regression, Logistic Regression with one Variable and with Multiple Variables.

UNIT IV	REGULARIZATION	12

Regularization and its Utility: The problem of Overfitting, Application of Regularization in Linear and Logistic Regression, Regularization and Bias/Variance.

UNIT V	NEURAL NETWORKS	12

Introduction, Model Representation, Gradient Descent vs. Perceptron Training, Stochastic Gradient Descent, Multilayer Perceptron's, Multiclass Representation, Back Propagation Algorithm.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	0	0	30	60+30

TEXT BOOK

1. Ethem Alpaydin, "Introduction to Machine Learning" 2nd Edition, The MIT Press, 2009.
2. Tom M. Mitchell, "Machine Learning", First Edition by Tata McGraw-Hill Education, 2013.

REFERENCES:

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning" by Springer, 2007.
2. Mevin P. Murphy, "Machine Learning: A Probabilistic Perspective" by The MIT Press, 2012.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

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

B.Sc (Animation and Multimedia)

XGL101			BASIC ENGLISH COMMUNICATION SKILLS	L	T	P	SS	C
				2	0	0	2	2
C	P	A		L	T	P	SS	H
				2	0	0	2	4
2	0	0						

COURSE OUTCOMES:		Domain	Level
CO1	***Recall*** the basic grammar and using it in proper context	Cognitive	Remembering
CO2	***Explain*** the process of listening and speaking	Cognitive	Understanding
CO3	***Adapt*** important methods of reading	Cognitive	Creating
CO4	***Demonstrate*** the basic writing skills	Cognitive	Understanding

SYLLABUS		HOURS
UNIT I	**Grammar**	**7**
i. Major basic grammatical categories ii. Notion of correctness and attitude to error correction		
UNIT II	**Listening and Speaking**	8
iii. Importance of listening skills iv. Problems of listening to unfamiliar dialects v. Aspects of pronunciation and fluency in speaking vi. Intelligibility in speaking		
UNIT III	**Basics of Reading**	7
vii. Introduction to reading skills viii. Introducing different types of texts – narrative, descriptive, extrapolative		
UNIT IV	**Basics of Writing**	8
ix. Introduction to writing skills x. Aspects of cohesion and coherence xi. Expanding a given sentence without affecting the structure xii. Reorganizing jumbled sentences into a coherent paragraph xiii. Drafting different types of letters (personal notes, notices, complaints, appreciation, conveying sympathies etc.)		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
30	0	0	30	60

Text books

1. Acevedo and Gower M (1999) Reading and Writing Skills. London, Longman 2. Deuter, M et.al. (2015). Oxford Advanced Learner's Dictionary of English (Ninth Edition). New Delhi, OUP

3. Eastwood, John (2008). Oxford Practice Grammar. Oxford, OUP

4. Hadefield, Chris and J Hadefield (2008). Reading Games. London, Longman 5. Hedge, T (2005). Writing. Oxford, OUP

6. Jolly, David (1984). Writing Tasks: Stuidents' Book. Cambridge, CUP

7. Klippel and Swan (1984). Keep Talking. Oxford, OUP

8. Saraswati, V (2005). Organized Writing 1. Hyderabad, Orient Blackswan

9. Swan, Michael. (1980). Practical English Usage. Oxford, OUP

10. Walter and Swan (1997). How English Works. Oxford, OUP

Table 1: Mapping of Cos with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12	PSO 1	PSO2
CO1	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO2	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO3	1	0	0	0	0	0	1	0	1	0	0	0	0	0
CO4	2	0	0	0	0	0	1	0	1	0	0	0	0	0
Total	7	0	0	0	0	0	6	0	4	0	0	0	0	0
Scaled Value	2	0	0	0	0	0	2	0	1	0	0	0	0	0
	1	0	0	0	0	0	1	0	1	0	0	0	0	0

1-5= 1, 6-10 = 2, 11-15= 3

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

Table 2: Mapping of COs with GAs:

	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA10	GA11	GA12
CO1	0	0	0	0	0	0	0	1	1	2	0	0
CO2	0	0	0	0	0	0	0	0	0	2	0	0
CO3	0	0	0	0	0	0	0	0	0	1	0	0
CO4	0	0	0	0	0	0	0	0	0	0	1	0
Total	0	0	0	0	0	0	0	1	1	5	2	0
Scale	0	0	0	0	0	0	0	1	1	1	1	0

1-5= 1, 6-10 = 2, 11-15= 3

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

XAM102A			அறிவியல்தமிழ்	**L**	**T**	**P**	**C**
				2	**0**	**0**	**2**
C	**P**	**A**		**L**	**T**	**P**	**H**
2.9	**0.1**	**0**		**2**	**0**	**0**	**2**

PREREQUISITE: Nil

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize(அடையாளம் காணுதல்)***பல்வேறு அறிவியல் துறைசார்ந்த நுட்பங்கள், கலைச் சொல்லாக்க உத்திகள் போன்றவற்றைத் தமிழ்மொழி மூலம் அறிந்துகொள்ளல்.	Cognitive	Remember
CO2	***Choose***	Cognitive	Remember

	(தெரிவுசெய்தல்)வடமொழிவேர்ச்சொற்கள்,புவியியல்,நிலவியல் பற்றிப் பழந்தமிழ் இலக்கியங்கள் மூலம் அறிந்துகொள்ளல்.		
CO3	***Describe(விளக்குதல்)***தொல்காப்பியம் மூலம் அறிவியல் செய்திகளைஉணர்தல்.	Cognitive Psychomotor	Understand Set
CO4	***Apply (பயன்படுத்துதல்)***பல்வேறுகல்வித்துறைசார்ந்தபிரிவுகள்,பல்வேறுகல்வித்துறைசார்ந்தபிரிவுகள் குறித்துதெளிவுபெறல்.	Cognitive	Apply
CO5	***Analyze(பகுத்தல்)***அறிவியல் சிறுகதைகளின் தோற்றம் மற்றும் வளர்ச்சிநிலைநாடகங்களின் பங்குகுறித்துதெளிவுபெறுதல்.	Cognitive	Analyze

அலகு– 1	**அறிவியல்தமிழ் அறிமுகம்**	**9**

அறிவியல்தமிழ் - பொறியியல்,தொழில்நுட்பம்,மருத்துவம்,உழவியல். தமிழில் அறிவியல் - தமிழில் நுட்பம். படைப்புப் பணி–சொல்லாக்கஉத்திகள் - நுட்பமானவேறுபாடுகளைஉணர்ந்துசொல்லாக்கம் செய்தல் - கலைச்சொற்கள் - இந்தியமொழிகளுக்குப் பொதுவானகலைச் சொற்களைஉருவாக்குதல் - வடமொழிவேர்ச்சொற்களைமிகுதியாகக் கொண்டிருத்தலைப் பயன்படுத்துதல்.

அலகு– 2	**பிறஅறிவியல் துறைகள்**	**9**

புவியியல்,நிலவியல் பற்றிபழந்தமிழ் இலக்கியம் குறிப்பிடும் தகவல்கள் - தொல்காப்பியம் குறிப்பிடும் உயிரியல்,மண்ணியல் பற்றியஅடிப்படைச் செய்திகள் - தமிழ் மருத்துவக் கல்வி - அறிவியல் தமிழுக்கு இதழியல் உத்திகள் - வளர் தமிழ்.

அலகு– 3	**பல்வேறுகலைகளில் அறிவியல்**	**9**

மொழியியல் கல்வி–கட்டடக் கலைக்கல்வி–சமுதாயக்கல்வி–சேய்மைக்கல்வி–மண்ணியல்,புவியியல்,கணக்கியல் ஆகியவைஇணைந்தகல்வி - இக்காலக் கல்விப் பொதுநிலை–கலை,அறிவியல் - என்பவற்றின் விளக்கங்கள்.

அலகு– 4	**அறிவியல் தமிழில் சிறுகதைகளின் பங்கு**	**9**

சிறுகதை -இலக்கணம் உருவாக்கும் உத்திகள் - சிறந்தசிறுகதைகள் - சிறுகதை வகைகள் - நல்லசிறுகதைஉருவாக்கம் - வரலாறு–சமூகம் - மொழிபெயர்ப்புமற்றும் அறிவியல் சிறுகதைகள்.

அலகு–5	**அறிவியல் தமிழில் நாடகங்களின் பங்கு**	**9**

நாடகம் - நாடக இலக்கணம், இருவகைநாடகங்கள் - படிப்பதற்குரியநாடகம் - நடிப்பதற்குரியநாடகம் - சரித்திரநாடகம்,சமூகநாடகம் - நகைச்சுவைநாடகங்கள் - அமெச்சூர் நாடகங்கள் - தொழில்முறைநாடகங்கள்.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	---	---	45

மேற்பார்வைநூல்கள்:

1. அறிவியல் தமிழ் - டாக்டர் வா.செ. குழந்தைச்சாமி
2. வளர் தமிழ் - இதழ்கள்
3. இலக்கியவரலாறு–சிறுகதைபற்றியது
4. இலக்கியவரலாறு–புதினம்பற்றியது

Table 1: CO Versus PO mapping.

B.Sc. A & M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1		1							
CO2		1							
CO3		1					1		
CO4	1	2	2	1		1	2		

CO5	2	2	2	2		1	2		
Total	3	7	4	3		2	5		
Scaled Value	1	1	1	1			1		

1 – 5 -> 1 6 – 10 ->2 11 – 15 -> 3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XAM103			**FOUNDATION OF ART**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**1**	**1**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.8	**0.2**	**0**		**3**	**1**	**3**	**1**	**8**

PREREQUISITE: Nil

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the importance of drawing material and tools.	Cognitive	Remember
CO2	***Choose*** the methods to make the drawings using lines and shapes.	Cognitive	Remember
CO3	***Describe*** the ways drawing by observation and ***achieve*** the knowledge on attitude.	Cognitive Psychomotor	Understand Set
CO4	***Apply*** the various perspective views in drawing pictures	Cognitive	Apply
CO5	***Analyze*** the different methods for lighting and shading to make the realistic pictures.	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**21**
Introduction to different drawing materials and tools: Dry media (Pencils, Charcoals, Chalks, Crayons, Pastels, Erasers, Smudging Tools), Wet Media (Dip pens, Disposable and Cartridge Pens, Brushes), Inks (Water based, Alcohol based, Indian/Chinese ink), Paints (Water based, Acrylic, Oil), Drawing surfaces (Papers, Newsprint, Watercolor paper, Charcoal paper, Canvas) Tools for erasing and sharpening: Palettes, Knives, Easels.		
UNIT II	**DOODLING AND SHAPES**	**21**
Doodling and noodling (Drawing straight lines, Drawing curved lines, Free hand drawing) Holding the pencil: Angle and direction of lines (Drawing lines, Circles, Ovals, Scribbles, Patterns Etc.) Shapes and forms, Memory and imagination drawing, Drawing with grids.		
UNIT III	**DRAWING FROM OBSERVATION**	**21**
Drawing from observation: Life drawing, Use of basic shapes and forms, Sketching poses, Rapid sketching from live models, Attitude: Gestures, Line drawing, Quick sketches, Thumbnails, Stick figures, Line of action, Balance, Rhythm, Positive and negative spaces, Silhouettes, Caricaturing fundamentals, Exaggeration.		
UNIT IV	**PERSPECTIVE DRAWING**	**21**
Perspective drawing, Vanishing points, Orthogonal lines, Horizon, Eye level. One point perspective, Two point perspective, Three point perspective, Multi-point perspective, Overlapping and intersection of shapes in one point, Two point and three point perspective views, Foreshortening.		
UNIT V	**LIGHTING AND SHADING**	**21**
Tones, Lighting and shading, Basic 3Dimensional light set up, Several types of shadows, Cast		

shadow, Contact shadow, Contour shadow, Reflected light, Overhang shadow, Highlight, Core shadow, Objects and shapes in perspective with light and shade.			
LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
45	**15**	**45**	**105**

REFERENCES:

1. Exploring the Elements of Design: Mark A. Thomas, Poppy Evans
2. The Art of Composition: Michael Jacobs
3. The Art of Pictorial Composition: Wolehonok
4. Complete Books of Artist Techniques: Dr. Kurt Herbers
5. Drawing for The Absolute and Utter Beginner: Claire Watson Garcia
6. Perspective Made Easy: Ernest R Norling
7. Perspective Drawing Handbook: Joseph D'Amelio .

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A &M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	3	2	1	2	2	1	1	0
CO2	1	2	3	2	2	3	3	3	0
CO3	2	2	3	2	2	3	3	3	0
CO4	1	3	3	2	1	3	3	3	0
CO5	2	1	3	2	3	2	3	1	0
AVG	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**0**

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

XAM 104			**PRINCIPLES OF ANIMATION**	**L**	**T**	**P**	**SS**	**C**
				4	**1**	**0**	**1**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.8	**0.2**	**0**		**4**	**1**	**0**	**1**	**6**

PREREQUISITE: Nil

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the importance of drawing and the animation.	Cognitive	Remember
CO2	***Choose*** the methods to make the drawings for animation.	Cognitive	Remember
CO3	***Describe*** the stages of animation and ***achieve*** the knowledge on animation.	Cognitive Psychomotor	Understand Set

CO4	***Apply*** the body languages concepts in making animated characters.	Cognitive	Apply
CO5	***Analyze*** the different actions to be performed by the character to make the realistic animation.	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**15**

Drawings with the help of basic shapes, Animal study, Human anatomy, Shading techniques, Live model study, Introduction- Importance of confidence, Difference between "looking at the drawing" and "seeing the drawing", What is observation, Procedure- How to approach, Importance of Guideline- Line of action, Overcome the fear, Drawing for animation.

UNIT II	**MAKE DRAWINGS FOR ANIMATION**	**15**

An Introduction on how to make drawings for animation, Shapes and forms, About 2d and 3d drawings, Caricaturing – fundamentals, Exaggeration, Attitude, Silhouettes, Boundary- breaking exercises and warm ups, gesture drawing, Line drawing and quick sketches, Drawing from observation, memory and imagination.

UNIT III	**STAGES OF ANIMATION**	**15**

Drawing for Animation, Exercises and warm ups on pegging sheet, Quick Studies from real life, Sequential movement drawing, Caricaturing the Action. Thumbnails, Drama and psychological effect, Motion Studies, Drawing for motion.

UNIT IV	**BODY LANGUAGE**	**15**

The Body language, Re-defining the drawings, Introduction to animation production process, Basic Principles in animation.

UNIT V	**ACTIONS OF CHARACTERS**	**15**

Squash and stretch, Anticipation, Staging, Straight ahead and pose to pose, Follow through and overlapping action, Slow in and slow out, Arcs, Secondary action, Timing, Exaggeration, Solid drawing, Appeal, Mass and weight, Character acting, Volume, Line of action, Path of action, Walk cycles-animal and human.

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

REFERENCES:

1. Graphics & Animation Basics , By Suzanne Weixel / Cheryl Morse
2. Basic Animation Ht25 - Walter Foster , By Walter Foster
3. Cartooning Basic Animation Ht25 - Walter Foster , By Walter Foster
4. Computer Graphics & Animation , By Prajapati Ak
5. Introduction To 3d Graphics & Animation Using Maya/Cd ,By Adam Watkins
6. www.animationmentor.com/animation-program/animation-basics.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	1	2	2	1	2	2	1	2
CO2	2	3	1	2	2	1	2	1	3
CO3	2	1	3	1	1	2	0	1	2
CO4	3	2	2	2	1	0	2	2	2
CO5	3	1	2	1	0	1	1	2	1
AVG	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**2**

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

XAM105			**INTRODUCTION TO COMPUTER GRAPHICS DESIGN**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**1**	**1**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.0	**0.8**	**0.2**		**3**	**1**	**3**	**1**	**8**

PREREQUISITE: Visual design

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Understand*** and ***recognize*** the Graphic Design concepts andits applications.	Cognitive	Understand Remember
CO2	***Understand*** the elements of designand ***Apply*** it to ***produce*** own shapes and color design.	Cognitive Psychomotor	Understand Apply Set
CO3	***Understand*** *the*principles of designand ***Apply*** it to ***develop***a page for Website and print media.	Cognitive Psychomotor	Understand Apply Set
CO4	***Understand*** the poster design concepts and ***develop*** posters for advertisement and academic poster presentation.	Cognitive Psychomotor	Understand Apply Set
CO5	***Equip*** themselves for self-employment and ***develop*** the employable skills.	Cognitive Affective	Remember Receiving Responding

UNIT I	**BASIC OF COMPUTER GRAPHICS**	**12+9**

Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphical Input Techniques, Graphics software and standards - Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives - character generation, line attributes, area-fill attributes, character attributers.

UNIT II	**2D TRANSFORMATION , VIEWING AND 3D CONCEPTS**	**12+9**

Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-

sutherland), polygon clipping - 3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, spline representation, Bazier curves and surfaces, B-spline curves and surfaces, 3D scaling, rotation and translation, composite transformation

UNIT III	INTRODUCTION TO THE GRAPHIC DESIGN and Its ELEMENTS	12+9

Introduction to the Graphic Design Industry - History of Graphic Design - Future of Graphic design - Introduction to the equipment. The introduction of each piece of equipment would be tied to a relevant graphics project. Elements of Design -Colour - Line - Shape - Space- Texture - Value : Principles of Design Balance , Contrast, Emphasis/Dominance ,Harmony ,Movement/Rhythm , Proportion Repetition/ Pattern , Unity , Variety.

UNIT IV	TYPOGRAPHY and POSTER DESIGN	12+9

Typography -Anatomy of a letter- Typefaces - Typographic Measurement - Typographic Standards - Typographic Guidelines - Creating images for print & web -Formats -Resolution. Raster Vs Vector -Editing Images - Ethics - Copyright laws.

Poster Design - Concept of Poster - Importance of posters - Qualities of a good poster - Project work on poster design - Calendar/Postage stamp design - Pennants/Buntings/Flags

UNIT V	GRAPHIC DESIGN CAREERS	12+9

Careers in graphic design - Graphic Design careers and job avenues -Competencies for Employment employable skills - Building an artist portfolio - Setting up graphic design enterprise - Factors to consider - Building a portfolio of works - Meaning and Purpose - Hard and Soft copies.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	15	45	105

REFERENCES:

1. Thinking with Type: A Primer for Designers: A Critical Guide for Designers,Writers, Editors, & Students Paperback – September 2, 2004 By Ellen Lupton.
2. Jennifer's-Introduction to Typography -An Advanced Communication Design Project-by
3. Jennifer Simmer-Winter Term 2005
4. Typography- A guide to setting perfect type-by James Felici-Second Edition
5. Poster Design -A guide for FIMS students & staff: How to produce effective &
6. attractive scientific posters
7. Policing Cyber crime by Petter Gottschalk-Bookboon.com
8. Portfolio Guidelines- All you need to know about your portfolio
9. Elements of Design (The Basics of Graphic Design)-net material About Graphic Design- e-copy –net material
10. The Visual Display of Quantitative Information Hardcover – January 1, 2001,by Edward R. Tufte

Web Resources:

Poster Design:

1.https://www.ncsu.edu/project/posters/index.html

2.http://www.posterpresentations.com/html/free_poster_templates.html

Cyber crime:

3. http://www.posterpresentations.com/html/free_poster_templates.html
4. www.tutorialspoint.com

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A &M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	2	1	2	1	1	1	0
CO2	2	3	3	3	2	2	3	3	0
CO3	2	3	3	3	2	2	3	3	0
CO4	2	3	3	3	1	2	3	3	0
CO5	2	3	3	1	3	2	3	1	0
AVG	**2**	**3**	**3**	**2**	**2**	**2**	**3**	**2**	**0**

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

COURSE CODE	**XUM106**	**L**	**T**	**P**	**SS**	**C**
COURSE NAME	**HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY**	**0**	**0**	**0**	**0**	**0**
PREREQUISITES	**-**	**L**	**T**	**P**	**SS**	**H**
C:P:A	**1.5:0:0.5**	**2**	**0**	**0**	**1**	**3**

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

UNIT I HUMAN ETHICS AND VALUES	**6**
Human Ethics and values - 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.	
UNIT IIGENDER EQUALITY	**6**
Gender Equality - Gender Vs Sex, Concepts, definition, Gender equity, equality, and empowerment. Status of Women in India Social, Economic, Education, Health, Employment, HDI, GDI, GEM. Contributions of Dr.B.R. Ambetkar, ThanthaiPeriyar and Phule to Women Empowerment.	
UNIT IIIWOMEN ISSUES AND CHALLENGES	**6**
Women Issues and Challenges- 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, and Rights to Education,	

Medical Termination of Pregnancy Act, and Dowry Prohibition Act.

UNIT IV HUMAN RIGHTS	6

Human Rights Movement in India – The preamble to the Constitution of India, Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economic, Social and Cultural Rights, Rights against torture, Discrimination and forced Labor, Rights and protection of children and elderly. 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.

UNIT V GOOD GOVERNANCE AND ADDRESSING SOCIAL ISSUES	6

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	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
30	0	15	0	45

Textbook

6. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
7. Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights, 1998).
8. Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).
9. Dr. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
10. Dr. Veeramani, K. (ed) Periyar Feminism, (PeriyarManiammai University, Vallam, Thanjavur:2010).

Reference Books

5. Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).
6. Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).
7. Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).
8. Kaushal, Rachna, Women and Human Rights in India (New Delhi: Kaveri Books, 2000)

E-Reference

http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p
6. http://cvc.nic.in/welcome.html.
7. https://www.transparency.org/
8. https://www.hrw.org/world-report/2015/country-chapters/india

Mapping of COs with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1					2	2	1			
CO2					2	2				

CO3						2				
CO4						2	1			
CO5						3				
Total					4	11	2			
Scaled Value					1	2	1			

1 – 5 → 1, 6-10 → 2, 11 – 15→ 3

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

XGL201			**ADVANCED ENGLISH COMMUNICATION SKILLS**	**L**	**T**	**P**	**SS**	**C**
				2	**0**	**0**	**0**	**2**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
1.5	**0**	**0.5**		**2**	**0**	**0**	**2**	**4**

PREREQUISITE: Nil

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
On the successful completion of this course students would be able to			
CO1	***Recall*** the basic grammar and using it in proper context	Cognitive	Remembering
CO2	***Explain*** the process of listening and speaking	Cognitive	Understanding
CO3	***Adapt*** important methods of reading	Cognitive	Creating
CO4	***Demonstrate*** the basic writing skills	Cognitive	Understanding

UNIT I	**Advanced Reading**	**7**
i. Reading texts of different genres and of varying length ii. Different strategies of comprehension iii. Reading and interpreting non-linguistic texts iv. Reading and understanding incomplete texts (Cloze of varying lengths and gaps; distorted texts.)		
UNIT II	**Advanced Writing**	**8**
v. Analysing a topic for an essay or a report vi. Editing the drafts arrived at and preparing the final draft vii. Re-draft a piece of text with a different perspective (Manipulation exercise) viii. Summarise a piece of prose or poetry ix. Using phrases, idioms and punctuation appropriately		
UNIT III	**Principles of communication and communicative competence**	**7**
x. Introduction to communication – principles and process xi. Types of communication – verbal and non-verbal xii. Identifying and overcoming problems of communication xiii. Communicative competence		
UNIT IV	**Cross Cultural Communication**	**8**
xiv. Cross-cultural communication		

LECTURE	**TUTORIAL**	**SELF STUDY**	**PRACTICAL**	**TOTAL**
30	**0**	**30**	**0**	**60**

REFERENCES:

1. Bailey, Stephen (2003). Academic Writing. London and New York, Routledge.
2. Department of English, Delhi University (2006). Fluency in English Part II. New Delhi, OUP

3. Grellet, F (1981). Developing Reading Skills: A Practical Guide to Reading Skills. New York, CUP
4. Hedge, T. (2005). Writing. London, OUP
5. Kumar, S and Pushp Lata (2015). Communication Skills. New Delhi, OUP
6. Lazar, G. (2010). Literature and Language Teaching. Cambridge, CUP
7. Nuttall, C (1996). Teaching Reading Skills in a Foreign Language. London, Macmillan Raman, Meenakshi and Sangeeta Sharma (2011). Technical Communication: Principles and Practice. New Delhi, OUP

XES202			ENVIRONMENTAL STUDIES	L	T	P	SS	C
				2	0	0	0	2
C	P	A		L	T	P	SS	H
1.5	0	0.5		2	0	0	1	3

PREREQUISITE : Nil

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Remember Understand
CO2	***Illustrate*** the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.	Cognitive	Understand
CO3	***Identify*** the facts, consequences, preventive measures of major pollutions and ***recognize*** the disaster phenomenon	Cognitive Affective	Remember Receiving
CO4	***Explain*** the socio-economic, policy dynamics and***practice*** the control measures of global issues for sustainable development.	Cognitive	Understand
CO5	the impact of population and the concept of various welfare programs, and ***apply*** themodern technology towards environmental protection.	Cognitive	Understand Apply

UNIT I	**INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY**	**6**

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.

UNIT II	ECOSYSTEMS AND BIODIVERSITY	6

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.

UNIT III	ENVIRONMENTAL POLLUTION	6

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.

UNIT IV	SOCIAL ISSUES AND THE ENVIRONMENT	6

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.

UNIT V	HUMAN POPULATION AND THE ENVIRONMENT	6

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.

Lecture	Tutorial	Self-Study	Practical	Total
30	0	15	0	45

Text book

3. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.
4. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, 2003

Reference Books

11. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.
12. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.
13. Introduction to International disaster management, Butterworth Heinemann, 2006.
14. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.
15. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, 2009.
16. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ.,

House, Mumbai, 2001.
17. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.
18. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, 2003.
19. Sundar, Disaster Management, Sarup& Sons, New Delhi, 2007.
20. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.

E-references

8. http://www.e-booksdirectory.com/details.php?ebook=10526
9. https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science
10. https://www.free-ebooks.net/ebook/What-is-Biodiversity
11. https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4
12. http://bookboon.com/en/pollution-prevention-and-control-ebook
13. http://www.e-booksdirectory.com/details.php?ebook=8557
14. http://www.e-booksdirectory.com/details.php?ebook=6804

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	2						2		2	2
CO2	1						2			2
CO3	2	1	2				3		2	3
CO4	2	2	2				2			3
CO5	2				3	3				2
	9	**3**	**4**		**3**	**3**	**9**		**4**	**12**
Scaled value	**2**	**1**	**1**		**1**	**1**	**2**		**1**	**3**

XAM203			**VECTOR GRAPHICS**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**1**	**1**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.8	**0.2**	**0**		**3**	**1**	**3**	**1**	**8**

PREREQUISITE: Nil

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Understand*** and ***recognize*** the vector Graphic Design concepts andits usage.	Cognitive	Understand Remember
CO2	***Remember*** the color models and object shapesand ***Apply*** it to ***produce*** own shapes and color design.	Cognitive Psychomotor	Remember Apply Set
CO3	***Understand*** *the*principles of paths, drawing tools and ***Apply*** it to ***develop***various styles in graphic design.	Cognitive Psychomotor	Understand Apply Set
CO4	***Understand*** the layers concepts and ***develop*** various designs by applying filters.	Cognitive Psychomotor	Understand Apply

			Set
CO5	***Remember*** the basics of vector graphicsand ***develop*** the skills in web designing.	Cognitive Affective	Remember Receiving Responding

UNIT I	**INTRODUCTION**	**21**
About Images – Types of Images, Vector Images, and Raster Images –Resolution in Images – Creating a new document – Tool box - Foreground and background color- Graph Tools – Opening an existing document – Saving documents – Place Command.		
UNIT II	**COLOR MODELS**	**21**
About colors – Color Models – Selecting Objects – Correcting Mistakes – Basic Shapes – Grouping of Objects – Transformation Tools – Arranging Objects – Bring to Front, Bring Forward , Send Backward, Send to Back, Palette – Live Color, Swatches Palette , Stroke Palette, Transparency Palette ,Gradient Palette, Brushes Palette		
UNIT III	**PATHS AND DRAWING TOOLS**	**21**
Path – Anchor Points – Direction Lines- Direction Points – Drawing Tools –Pen tool, Pencil tool, Paintbrush tool, Smooth tool, Path erase tool , Symbolism Tools –Slice Scaling – Graphic Styles – Text tool –Warping text ,character styles , paragraph styles		
UNIT IV	**LAYERS AND FILTERS**	**21**
Layers – Layers Panel-Creating New layer, Releasing Objects to Separate Layers, Consolidating Layers and Groups – Lock/Unlock Layers – Compound Paths –Clipping Mask –Filters & Effects		
UNIT V	**ILLUSTRATOR FOR WEB**	**21**
Illustrator for Web – Saving for the web – Importing /Exporting , scalable Vector Graphics – Shock Wave Files – Linking Objects to URLs for Internet Web Pages – Slices-Creating Slices, Setting Slice Options, Viewing Slices, Selecting and Modifying Slices		

LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
45	**15**	**45**	**105**

REFERENCE BOOKS:

1. Adobe Illustrator - A Complete Course and Compendium of Features, Jason Hoppe, Rocky Nook Publications, 2020
2. Adobe Illustrator CC For Dummies, David Karlins, 2020
3. Adobe Illustrator CC 2020 For Beginners Sebastion Gray, Independently Published, John Wiley & Sons Inc., 2019

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A &M	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	3	2	1	2	2	1	1	0
CO2	1	2	3	2	2	3	3	3	0
CO3	2	2	3	2	2	3	3	3	0
CO4	1	3	3	2	1	3	3	3	0
CO5	2	1	3	2	3	2	3	1	0
AVG	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**0**

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

XAM204			DIGITAL PHOTOGRAPHY	L	T	P	SS	C
				3	1	1	1	6
C	P	A		L	T	P	SS	H
2.2	0.6	0.2		3	1	3	1	8

PREREQUISITE: Nil

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the concept of Photography.	Cognitive	Remember
CO2	***Know*** an art using different type of photography.	Cognitive Psychomotor	Apply
CO3	***Examine*** various digital image and processing.	Cognitive Psychomotor	Apply
CO4	***Describe*** the various methods of image retouching	Cognitive	Remember
CO5	***Design*** a photo story for visualization.	Cognitive Affective	Analyze

UNIT I	INTRODUCTION	9+12

Basics of Photography –Aperture - Shutter Speed – ISO - Balancing Exposure - Scene Modes - Exposure Compensation – Histogram - RGB/CMYK Color Model - Basic White Balance - Depth of field - Half Press Focus - Composition (Rule of Thirds).

Lab: Rule of Thirds Composition

UNIT II	TYPES OF PHOTOGRAPHY	9+12

Travel Photography & Focusing and Bracketing - Portraiture Photography & Flash Photography - Sports & Nature photography - Macro Photography & Panning and Metering Modes - Outing Portrait - Night Photography & Photography Effect - Night & Events Outing - Basic Studio processing.

Lab: Landscape Candid Shots

UNIT III	DIGITAL IMAGE AND PROCESSING	9+12

Digital image method of storing and processing digital image:Raster and Vector method - Representation of digital image: Resolution – Pixel Depth - – Pixel Aspect Ratio – Dynamic Colour Range – File Size – Colour Models – Image Compression – File Formats – Calculating image resolution for outputs.

Lab: Portraits Panorama

UNIT IV	DIGITAL RETOUCHING & IMAGE ENHANCEMENT	9+12

Image size – Resolution – Selection tools and techniques – History – Retouching tools – Layers – Photo mounting - techniques – Incorporation of text into picture. Digital Manipulation: Applying selective effects to images and filters with masks and different digital darkroom effects.

Lab: Images Retouching

UNIT V	PHOTO STORY VISUALIZATION	9+12

Visualization - Concept development - Creativity - One line story - Composition - Camera Movements - Shot - Scene - Atmosphere and Mood - Light and Color

Lab: Stop motion animation

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	15	45	105

REFERENCES:

1. Galer.M, 2015, “Introduction to Photography”, First Edition, Focal Press, France.
2. Miller 2008 “Digital Story telling” Focal Press (Elsevier)
3. Julian Calder, John C Carrett - “The 35 mm Photographer’s hand book”, Marshall edition
   London,1999
4. John Cant Antine and Julia Valice - ” The Thames –“ Hudson manual of Professional Photography”, Thames- Hudson, 1983.
5. Tom Ang- ” Digital Photography”, Mitchell Beazley, Octupus Publishing group Ltd London. UK 2001.
6. Anchell.S, 2015, “Digital Photo Assignments”, First Edition, Focal Press, France.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	0	1	1	1	1	1
CO2	2	2	3	2	1	2	2	1	1
CO3	1	1	2	1	2	1	1	1	1
CO4	1	1	2	1	2	3	1	1	1
CO5	1	1	2	1	2	2	1	1	1
AVG	**2**	**1**	**2**	**1**	**2**	**2**	**1**	**1**	**1**

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

XAM205			BASICS OF CLAY MODELING	L	T	P	SS	C
				3	0	1	2	6
C	P	A		L	T	P	SS	H
4	0	0		3	0	2	2	7

PREREQUISITE: Nil

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** how the study of clay relates to animation disciplines.	Cognitive	Remember
CO2	***Relate*** knowledge of the character design in clay materials and process.	Cognitive Psychomotor	Analyze
CO3	***Interpret*** design principles in their individual projects.	Cognitive	Understand
CO4	***Establish*** using clay modeling to build basic shapes.	Cognitive	Create
CO5	***Apply*** techniques for working in stop motion animation.	Cognitive	Apply

UNIT I	**INTRODUCTION**	**15**
Clay animation: concepts and types – clay tools – Armature – clay modeling process.		
UNIT II	**BASIC SHAPES IN CLAY**	**15**
Geomatrical shapes in clay – Background in clay- Vehicles in clay – Buildings in clay.		
UNIT III	**CHARACTER DESIGNING IN CLAY**	**15**
Model sheet of character-Humana body parts in clay – Animal models in clay – Fruits and vegetables – complete human figure in clay model.		
UNIT IV	**CLAY ANIMATION**	**15**
Cartoon designing in clay – Hair style in clay – Face mask in clay – case study making a indoor/outdoor with environment & characters in clay.		
UNIT V	**STOP MOTION ANIMATION**	**15**
Making of film using stop motion technique - Adding visual & Sound Effects - Digital Editing		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	0	30	75

REFERENCES:

1. The Advanced art of stop motion animation by Ken.A.Priebe by cengage learning
2. A sculptor's Guide to Tools and Materials Second edition by Bruner F. Barrie

E- RESOURCES

1. http://thevirtualinstructor.com/blog/sculpting-materials-for-beginners
2. http://www.chalkstreet.com/clay-modeling-and-pottery-for-beginners/
3. ebook - Clay Modelling for Beginners: An Essential Guide to Getting Started in the Art of Sculpting Clay

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	3	2	2	2	1	2	2
CO2	3	2	3	2	2	1	1	2	2
CO3	3	2	2	2	1	1	1	2	2
CO4	3	2	2	3	1	1	1	2	3
CO5	3	2	2	2	1	1	1	2	3
AVG	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**2**	**2**

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

XUM206			DISASTER MANAGEMENT	L	T	P	SS	C
				0	0	0	0	0
C	P	A		L	T	P	SS	H
2.75	0	0.25		2	0	0	1	3

PREREQUISTE: XES202

Course Outcomes		Domain	Level
CO1	***Understand*** and ***Recognize*** the concepts of disaster	Cognitive	Understand Remember
CO2	***Recognize and describe*** the causes and effects of disaster	Cognitive	Understand Remember
CO3	***Describe*** the various approaches of risk reduction	Cognitive	Remember
CO4	***Demonstrate*** the inter-relationship between disaster and development	Cognitive	Understand
CO5	Discuss hazard and vulnerability profile of India and respond to drills related to relief	Cognitive Affective	Remember Response

UNIT - I	**INTRODUCTION TO DISASTERS**	**6**

Concepts and definitions- Disaster, Hazard, Vulnerability, Resilience, Risks

UNIT - II	**DISASTERS: CLASSIFICATION, CAUSES, IMPACTS**	**6**

Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, pandemics, complex emergencies, Climate change

UNIT - III	**APPROACHES TO DISASTER RISK REDUCTION**	**6**

Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.

UNIT - IV	**INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT**	**6**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

UNIT - V	**DISASTER RISK MANAGEMENT IN INDIA**	**6**

Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).
The project / fieldwork to understand vulnerabilities work on reduction of disaster risk and build a cultural safety.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
30	0	0	15	45

TEXT BOOKS:

6. Coppola P Damon, "Introduction to International Disaster Management, Butterworth-Heinemann, 2015
7. K. N. Shastri, "Disaster Management in India", Pinnacle Technology, 2012
8. Gupta Anil K, Sreeja S. Nair, "Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
9. Lee Allyn Davis, "Natural Disasters", Infobase Publishing, 2010
10. Andharia J, "Vulnerability in Disaster Discourse", JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008

REFERENCES:

3. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
4. Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.

E- RESOURCES:

5. NIDM Publications at http://nidm.gov.in- Official Website of National Institute of Disaster Management (NIDM), Ministry of Home Affairs,
6. http://cwc.gov.in , http://ekdrm.net , http://www.emdat.be ,
7. http://www.nws.noaa.gov , http://pubs.usgs.gov , http://nidm.gov.ini
8. http://www.imd.gov.in

Mapping of CO with GA

COs	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA1	GA11	GA12
CO1	1					3	2	1				1
CO2	1					3	2	1				1
CO3	1					3	2	1				1
CO4	1					3	2	1				1
CO5	1					3	2	1				1
Total	**5**					**15**	**10**	**5**				**5**
Scaled value	**1**					**3**	**2**	**1**				**1**

XAM301			**MULTIMEDIA**	**L**	**T**	**P**	**SS**	**C**
				2	**0**	**0**	**2**	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
				2	**0**	**0**	**2**	**4**
1.8	**1.2**	**0**						

PREREQUISITE: Principles of Animation

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Identify*** and ***describe*** the Multimedia components and its applications	Cognitive	Understand
CO2	***Understand*** the various digital audio technologies and file formats.	Cognitive Psychomotor	Understand Application Set
CO3	Gain a working knowledge and ***develop*** their skills in editing and altering text contents.	Cognitive	Understand Application
CO4	Understand the Computer Animation Fundamentals and working with video contents	Cognitive Psychomotor	Understand Analyze Set

CO5	Students can ***draw*** and ***develop*** plans to accomplish the project which include costing.	Cognitive Psychomotor	Understand Create Set

UNIT I	**INTRODUCTION**	**6+6**
Definition - Classification - Multimedia Application - Multimedia Hardware – Multimedia Software - CDROM - DVD.		
UNIT II	**MULTIMEDIA AUDIO**	**6+6**
Multimedia Audio: Digital Medium - Digital Audio Technology - Sound Cards - Recording - Editing - Mp3 - Midi Fundamentals - Working With Midi - Audio File Formats - Adding Sound To Multimedia Project		
UNIT III	**MULTIMEDIA TEXT**	**6+6**
Mm Text: Text In Multimedia - Multimedia Graphics: Coloring - Digital Imaging Fundamentals - Development And Editing - File Formats - Scanning And Digital Photography		
UNIT IV	**MULTIMEDIA ANIMATION**	**6+6**
Multimedia Animation: Computer Animation Fundamentals - Kinematics - Morphing - Animation S/W Tools and Techniques. Multimedia Video : How Video Works - Broadcast Video Standards - Digital Video Fundamentals - Digital Video Production And Editing Techniques - File Formats		
UNIT V	**STAGES OF MULTIMEDIA PROJECT**	**6+6**
Multimedia Project: Stages Of Project - Multimedia Skills - Design Concept - Authoring - Planning And Costing - Multimedia Team.		

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
30	**0**	**0**	**30**	**60**

REFERENCE BOOKS:

1. Multimedia Magic - S.Gokul revised and updated second edition - BPB
2. Multimedia Making it Work –TayVaughen 6th edition - TMH

E-RESOURCE

1. https://showwithmedia.com/ebook/
2. https://users.dimi.uniud.it/~antonio.dangelo/MMS/materials/Fundamentals_of_Multimedia.pdf
3. https://users.ece.utexas.edu/~ryerraballi/MSB/Contents.html

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	0	1	1	1	1	1
CO2	2	2	3	2	1	2	2	1	1
CO3	1	1	2	1	2	1	1	1	1
CO4	1	1	2	1	2	3	1	1	1
CO5	1	1	2	1	2	2	1	1	1
AVG	**2**	**1**	**2**	**1**	**2**	**2**	**1**	**1**	**1**

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

XAM302			CHARACTER & ENVIRONMENT SKETCHING	L	T	P	SS	C
				3	1	1	1	6
C	P	A		L	T	P	SS	H
				3	1	3	1	8
2.8	0.2	0						

PREREQUISITE: Foundation of Art

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Pencil Drawing.	Cognitive	Remember
CO2	***Express*** the different ways of line drawing perspective in Pencil drawing.	Cognitive	Understand
CO3	***Employ*** the understanding of the lights in Pencil drawing.	Cognitive	Apply
CO4	***Utilize*** the various shading methods effectively in making the realistic drawings.	Cognitive	Apply
CO5	***Design***and ***Draw*** the drawings using different types of pencils.	Cognitive Psychomotor	Create Set

UNIT I	HISTORY OF PENCIL DRAWING	12+9+3

Materials and Tools: Choosing the Right Kind and Quality-Pencil, Eraser, Drawing Pad, Drawing board, Paper Stumps or Cone Blenders, Pencil, Ruler Sharpener. BASICS IN DRAWING AND SKETCHING-The Different types of Pencil Grips-Tripod Grip, Extended Grip, Underhand Grip, And Overhand Grip

UNIT II	LINES PERSPECTIVE	12+9+3

Lines-Flat Lines, Accent Lines , Contour Lines, Scumble/Scribbling ,Cross Hatch Line ,Smudge Pointillism. Basic Perspectives in Drawing- An Introduction on Perspectives - Linear perspective, Zero Point Perspective,One Point perspective ,Two Point Perspective ,Three-Point perspective, Isometric Perspective ,Atmospheric Perspective. Basic Drawing Shapes

UNIT III	LIGHTING	12+9+3

Basic Elements of Light, Shadows, and Shading - Light, Shadows and Shadow Box. Constructing a Simple Shadow box, Kinds and Quality of Light, Hard Light, Soft light. Basic Elements of Shading - The Highlight or Full Light, The Cast Shadow, The Halftone The Reflected Light, The Shadow Edge

UNIT IV	SHADING	12+9+3

Different Shading Techniques - Regular Shading, Irregular Shading, Circular Shading, directional Shading.Add Tones and Values -Tips on Tones and Values, Examples on Shading.

UNIT V	FINISHING TOUCHES	12+9+3

Erasing and Dusting , Mixed Media Applications -Watercolor Pencils, Oil Colored Pencils, Drawing with Pencils in Oil Painting, Pen and Ink Drawing, Wall Painting ,Cartoon Drawing , Tips to Draw Faster

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	45	15	120

REFERENCES:

1. Pencil Drawing - A Beginner's Guide (e-book) – http://nicheempires.com.
2. Basic Drawing Techniques by Richard Box Pub: Winsor & Newton, (U.S.A)
3.The Complete Book of drawing techniques -a professional guide for the artist by Peter Stanyer.
4. Still Life by Sanjay Shelar, Jyotsana Prakashan(India).Pub.
5. Drawing and Anatomy by Victor Perard , Kingsport Press Pub(U.K).

WEB REFERENCE

1. https://in.pinterest.com/explore/environment-sketch
2. www.craftsy.com / Online Classes/Art & Photo.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	3	2	2	1	2	1	2
CO2	2	3	2	2	1	2	0	1	1
CO3	2	2	3	1	2	1	1	2	3
CO4	3	2	1	3	1	2	2	1	1
CO5	2	1	3	2	0	1	1	2	3
AVG	**2**	**2**	**3**	**2**	**1**	**1**	**1**	**1**	**2**

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

XAM303			**AUDIO AND VIDEO EDITING**	**L**	**T**	**P**	**SS**	**C**
				3	**0**	**1**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
				3	**0**	**2**	**0**	**5**
2.8	**0.2**	**0**						

PREREQUISITE: Computer Fundamentals

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the basics and objectives of editing.	Cognitive	Remember
CO2	***Discuss*** the various types of editing.	Cognitive	Understand
CO3	***Explain*** 2D and 3D graphics.	Cognitive	Apply
CO4	***Classify*** various elements of audio.	Cognitive	Analyze
CO5	***Describe*** the procedure for format conversion.	Cognitive Psychomotor	Perspective
UNIT I	**INTRODUCTION**		**9+6**

Concept and Objectives of Editing, Software and tools, Continuity and Jerk Enter and Exit in Frame, Title, Credits and Sounds. Sound editing, mixing sound, laying sound tracks, syncing sound and picture. Capturing video. Editing techniques for News, Documentary and Fiction and Ad Film.

Lab

1. Touring in to software
2. Setting up a project
3. Workspace

UNIT II	ELEMENTS OF THE EDITING	9+6

Picture transitions and their use, Elements of the editing, motivation, information, shot composition sound, camera angle, continuity. Types of the editings, action edit, and screen position edit, form edit, dynamic edit. Do's and don'ts of editing. Voice over and sound bytes, dubbing and mixing of sound. Computer hardware for editing.

Lab

1. Settings, Preferences and Managing Assets
2. Creating Videos
3. Creating Audios

UNIT III	ON LINE EDITING	9+6

On line editing in a multi-camera TV programme production. TV Graphics and Animation: Theory and Practice Elements of 2D Graphic Elements of 3D Graphics. 3D Modeling. 3D Animation. Special effects creation, Environmental special effects Lighting camera and texturing. Introduction to virtual sets. Film Analysis: The Editor's point of view Extensive sound recording, video editing, graphics and animation practical's. Participation in production exercises.

Lab

1. Adding Transitions
2. Exporting frames, clips and sequences
3. Applying Effects, Color Correction, and Opacity

UNIT IV	INTRODUCTION TO SOUND	9+6

Sound, Digital sound files, different sound formats, midi and digital audio, creating digital audio files, sound producing, sound extracting, Advantages and disadvantages of midi and digital, choosing between midi and Digital audio. Linking files: Sound for the World Wide Web, adding the sound to your multimedia project, production tips, audio recording, keeping track of your sound, testing and evaluation.

Lab

1. Adding audio effects
2. Editing and mixing audio
3. Adding video effects

UNIT V	RECORD CLIPS AND EDITING	9+6

Sound recording, editing digital recording, trimming, splicing and assembly, volume adjustments, format conversion, re sampling or downloading, fade-ins and fade - outs, equalization, time stretching, digital signal processing, reverting sound, making midi audio, audio file formats.

Lab

1. Creating Dynamic titles
2. Applying specialized editing tool
3. Integrating software with other applications

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	0	30	00	75

REFERENCES:

1. Editing Today: Smith, Ron F. and O'Connell, L.M, Published 2003, Blackwell Publishing

2. Nonlinear Editing: Media Mannel; Morris, Patrick, Published 1999 Focal Press.
3. Basic Elements of Filmmaking II Handbook, UW-Milwaukee Department of Film, 2004 Rob Danielson.
4. Audio system guide Video and film production by Chris Lyons, A shure Educational Publication

WEB REFERENCE

1. Filmmaking Guide by Tom Barrance ref:www.intofilm.org
2. http://www.amazon.in/Digital-Audio-Editing-Correcting-Enhancing/dp/0415829585
3. http://www.apress.com/9781484216477
4. http://www.amazon.com/Editing-Digital-Video-Complete-Technical/dp/0071406352
5. http://www.amazon.com/Audio-Video-Editing-Books/b?ie=UTF8andnode=15375301
6. http://www.amazon.in/The-Technique-Film-Video-Editing/dp/0240813979
7. https://opensource.com/resources/ebook/video-editing

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	1	2	2	2	1	1	1	1
CO2	2	1	2	1	2	1	1	2	1
CO3	1	1	1	1	1	1	1	3	1
CO4	1	0	1	1	2	1	1	1	1
CO5	1	1	2	1	1	2	3	2	1
AVG	**2**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**1**

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

XAM304			**2D ANIMATION**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**1**	**1**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
				3	**1**	**3**	**1**	**7+1**
2.6	**0.2**	**0.2**						

PREREQUISITE: Principles of Animation

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of 2D Animation.	Cognitive	Remember
CO2	***Summarize*** the knowledge on animation software and ***detect*** about the animation software.	Cognitive Psychomotor	Understand Perception
CO3	***Manipulate*** the symbols and text to animate, and ***identify*** and tested the animated symbols and text.	Cognitive Affective	Application Receiving
CO4	***Know*** about the action script used in animation software.	Cognitive	Understand
CO5	***Design*** and test the animation in web.	Cognitive	Create

UNIT I	INTRODUCTION TO 2D ANIMATION	12 +9

Basic Animation – Principles of Animation - Animation Types – 2D Animation – Understanding - Animation workflow - 2D animation software's – Introduction to animation software.

Lab:

1. Installing software
2. Create a animation software file.

UNIT II	GETTING STARTED	12+9

Understanding about the Timeline – Organizing about the Timeline – using of tools panel –preview the animated movie – modify the content and stage – saving your movie– publishing your movie –- understanding strokes and fills - creating with shapes – editing shapes – working with graphics.

Lab:

1. Working with timeline.
2. Publish the movie.
3. Working with shapes.
4. Working with graphics.

UNIT III	MANIPULATING SYMBOLS AND ANIMATE	12+9

Create the Symbols – Editing and managing symbols – change the size, position and color effects with instances – applying filter with special effects – Animation – Animating position– changing the pacing and timing – Animating transparency – filter – transformation – changing the path of the motion – nested animation – testing the animation.

Lab: 1. Working with symbols.
2. Apply special effects in movies.
3. Create and manipulate the animation.
4. Testing the animation.

UNIT IV	ACTION SCRIPT	12+9
UNIT V	WORKING WITH AUDIO, VIDEO AND CONTROLLING FLASH CONTENT AND PUBLISH FLASH DOCUMENT	12+9

Import sound files – edit sound files – audio and video encoding options – use cue points – embed video– Load and display external files – Control the movie clip timeline – test document – publish the document – publish project for web –Test project with mobile interactions – other 2d animation tools.

Lab: 1. Manipulating audio and video files
2. Embed video
3. Manipulating content
4. Test document.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	45	15	120

REFERENCES:

1. Cartoon Animation (How to Draw and Paint series) by Preston Blair.
2. Adobe Flash Professional CS6 Classroom in a Book, by adobe systems
3. Doug sahlin, Flash MX Action script for designers, Wiley publishing, 2002.
4. Roger braunstein, Action script 3.0 Bible, Second edition, Wiley publishing inc, 2010.

WEB REFERENCE

1. www.w3schools.com
2. www.tutorialspoint.com

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A &M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	3	2	1	2	2	1	1	0
CO2	1	2	3	2	2	3	3	3	0
CO3	2	2	3	2	2	3	3	3	0
CO4	1	3	3	2	1	3	3	3	0
CO5	2	1	3	2	3	2	3	1	0
AVG	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**0**

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

XAM306			**DIGITAL MATTE PAINTING**	**L**	**T**	**P**	**SS**	**C**
				0	**0**	**0**	**0**	**1**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
				1	**0**	**0**	**0**	**1**
1.5	**1.5**	**0**						

PREREQUISITE: Photoshop, Photography, and concept sketching for environments

COURSE OUTCOMES:

Course Outcomes	Domain	Level
After the completion of the course, students will be able to		
CO1: Describe and **Show** the various tools for digital matte painting	Cognitive Psychomotor	Remember Set
CO2: Apply the principles, techniques of digital matte painting and create various effects	Cognitive Psychomotor	Apply Orgination
CO3: Create fanciful and realistic new world	Cognitive Psychomotor	Orgination

SYLLABUS:

1. Basic principles of Digital matte painting & Simple exercise using main tools from Photoshop -(Clone, Grading Tool, Selection, Brushed, Alpha, Layers, Channels, Transform)
2. Clean Up technique for DMP + Sky replacement + Lighting.
3. Day to night technique
4. Extraction and composition techniques
5. Destruction techniques
6. Create a Snow Covered, Coastal, Mountain Town Matte Painting
7. Use Photography to Create a Scenic Matte Painting From a Sketch in Photoshop
8. Create a Mountain Fortress Using Matte Painting Techniques in Photoshop
9. Create an epic fantasy digital matte painting
10. Creating a Devastating Tidal Wave in Photoshop

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
15	**0**	**0**	**0**	**15**

References:
2. David B. Mattingly , "The Digital Matte Painting", First Edition, Wiley Publishing Inc., 2011
3. Derek Stenning, Charlie Bowater ,"Beginner's Guide to Digital Painting in Photoshop: Characters (A Beginner's Guide)", First Edition, 3DTotalPublishing, 2015
4. Derek Stenning, Charlie Bowater ,"Digital Painting Techniques: Practical Techniques of Digital Art Masters (Digital Art Masters Series)", First Edition, 3DTotalPublishing, 2009

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	3	2	2	1	1	1	2
CO2	2	2	3	2	2	1	1	1	2
CO3	2	1	2	1	1	1	1	1	2
AVG	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**2**

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

XAM401			**SCRIPT WRITING AND STORY BOARD DESIGNING**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**1**	**1**	**6**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
				3	**1**	**3**	**1**	**7+1**
2.8	**0.2**	**0**						

PREREQUISITE: Character & Environment Sketching

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Script writing.	Cognitive	Remember
CO2	***Express*** the different ways of Story preparation in Script.	Cognitive	Understand
CO3	***Employ*** the understanding of the Writing skills in Story board designing.	Cognitive	Apply
CO4	***Utilize*** the various advertising methods effectively in making the realistic shooting spot.	Cognitive	Apply
CO5	***Design*** and ***Draw*** the story board writing using different types of subjects.	Cognitive Psychomotor	Create Set

UNIT I	**SCRIPT**	**12+9**

Script: concept, forms and utility, Basic principles of writing a script -Importance of script writing.

Lab: Script for a short film

UNIT II	**STORY**	**12+9**

Writer and Producer- Researching the script -Story Development ,Plots in script.

Lab: Story Board for a comic story

UNIT III	WRITING	12+9
Descriptive writing ,Analytical writing -Writing fiction - Writing script for video programmes, Concept of Shooting Script. **Lab: Script - film review**		
UNIT IV	**ADVERTISING**	**12+9**
Script writing for theatre, Script writing for Advertising -Script writing for planetarium. **Lab: Script and story board for a given situation**		
UNIT V	**STORY BOARD**	**12+9**
Introduction to Storyboard- Parts of storyboard --Advantages of storyboarding Interactive Storyboarding -Designing of Storyboard exercise. **Lab: Screen play**		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	45	15	120

REFERENCES

1. Chawdhary, Nirmalkumar, How to write film screenplay, Kanishka publishers, distributers, New Delhi- 110002,– 2009,ISBN 978-81-8457-112-7.
2. Rubenstein, Paul Max, Martin Jo Maloney, Writing For the Media, Film Television, Video and Radio, Prentive Hall,– Englewood Clifts, New Jersey 07632, 1988, ISBN: 0-13- 971508-7-01
3. Whitaker, Harold, John Halas, Updated by Tom Sito, Timing for Animation, Focal Press Elsevier, New York & Singapore, 2009 ISBN: 978-0-240-52160-2.

WEB REFERENCE

1. https://www.acmi.net.au/education/school-program-and-resources/script-storyboard/
2. https://www.storyboardthat.com/articles/f/overview-and-introduction-to-films-commercials-and-animations
3. https://www.vyond.com/resources/what-is-a-storyboard-and-why-do-you-need-one/

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO								PSO	
	1	2	3	4	5	6	7		1	2
CO1	3	2	3	2	2	1	2		1	2
CO2	2	3	2	2	1	2	0		1	1
CO3	2	2	3	1	2	1	1		2	3
CO4	3	2	1	3	1	2	2		1	1
CO5	2	1	3	2	0	1	1		2	3
AVG	**2**	**2**	**2**	**2**	**1**	**1**	**1**		**1**	**2**

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

XAM402			COMPOSITING TECHNIQUES	L	T	P	SS	C
				3	0	1	2	6
C	P	A		L	T	P	SS	H
				3	0	2	2	5+2
3.0	0	0						

PREREQUISITE: Audio and Video editing

COURSE OUTCOMES:

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1:	***Recognize*** the basic concepts of logical effects	Cognitive	Remember
CO2:	***Select*** the various pyrotechniques to create an effective scene.	Cognitive	Apply
CO3:	***Examine*** various color correction and image optimization	Cognitive	Apply
CO4:	***Classify*** the various unreal effects	Cognitive	Understand
CO5:	***Analyze***a right motion tracking tools to produce an effective scene.	Cognitive	Analyze

UNIT I	INTRODUCTION	9+6

Composite in After Effects-A Basic Composite-Get Settings Right-The User Interface: Use It like a Pro-Effects in After Effects: Plug-ins and Animation Presets-Output: Render Queue and Alternatives-Assemble Any Shot Logically- The Timeline-Dreaming of a Clutter-Free Workflow-Timing: Keyframes and the Graph Editor-Shortcuts Are a Professional Necessity-Animation: It's All About Relationships-Accurate Motion Blur-Timing and Retiming

UNIT II	COLOR CORRECTION	9+6

Color Correction-Color Correction and Image Optimization-Levels: Histograms and Channels-Curves: Gamma and Contrast-Hue/Saturation: Color and Intensity-Compositors Match Colors-Beyond the Ordinary, Even Beyond After Effects- Rotoscoping and Paint-Roto Brush and Refine Edge-Articulated Mattes-Refined Mattes: Feathered, Tracked-Paint and Cloning-Avoid Roto and Paint

UNIT III	CAMERA AND OPTICS	9+6

The Camera and Optics-The Unreal After Effects Camera-3D and CINEMA 4D-The Camera Tells the Story-Don't Forget Grain-Real Cameras Distort Reality-Train Your Eye- Climate and the Environment-Particulate Matter-Sky Replacement-Fog, Smoke, and Mist-Billowing Smoke-Wind and Ambience-Precipitation

UNIT IV	PYROTECHNICS	9+6

Pyrotechnics: Heat, Fire, Explosions-Firearms-Energy Effects-Heat Distortion-Fire-Explosions-Advanced Color Options and HDR-What Is High Dynamic Range, and Does Film Even Still Exist?-Linear HDR Compositing: Life like-Linear LDR Compositing, Color Management and LUTs-Beyond Theory into Practice

UNIT V	EFFECTIVE MOTION TRACKING	9+6

Effective Motion Tracking-Track a Scene with the 3D Camera Tracker-Warp Stabilizer VFX: Smooth Move-The Point Tracker: Still Useful-Mocha AE Planar Tracker: Also Still Quite Useful-Camera Integration- Selections: The Key to Compositing-Beyond A Over B: How to Combine Layers-Edges on Camera -Transparency and How to Work with It-Mask Options and Variable Mask Feather-Mask Modes and Combinations-Animated Masks-Composite With or Without Selections: Blending Modes-Share a Selection with Track Mattes-Right

Tool for the Job.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**0**	**30**	**30**	**105**
REFERENCES				
1. Mark Christiansen Visual Effects and CompositingSTUDIO TECHNIQUES Adobe® After Effects® CC				
WEB REFERENCES				
1. www.slideshare.net. 2. www.proko.com				

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc A&M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	1	0	2	1	2	1	2	3	2
CO2	1	1	2	1	1	1	2	1	1
CO3	1	0	1	1	1	1	1	1	1
CO4	1	1	2	1	2	1	1	1	1
CO5	1	1	2	1	2	2	2	1	3
Average	2	1	3	2	3	2	3	2	3

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

XAM403			**3D ANIMATION**	**L**	**T**	**P**	**SS**	**C**
				3	**0**	**1**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
				3	**0**	**2**	**0**	**5**
2.8	**0.2**	**0**						

PREREQUISITE: 2D Animation

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of 3D animation basics.	Cognitive Psychomotor	Remember Perception
CO2	***Observe*** and ***Express*** the knowledge on using different modeling techniques in designing 3D animation.	Cognitive Psychomotor	Understand Perception
CO3	***Listen*** and ***Employ*** the animated objects and manipulate rigging the objects.	Cognitive Psychomotor Affective	Apply Perception Response
CO4	***Utilize*** texturing methods to ***improve*** the designing character for the realistic applications.	Cognitive Psychomotor Affective	Apply Mechanism Respond
CO5	***Design*** and ***Establish*** the lighting, shadow and camera for shading the surface and improve the performance by using dynamics.	Cognitive Psychomotor	Create Originate
UNIT I	**INTRODUCTION**		**9+6**
User Interface – Creating, Manipulating and viewing objects- viewing 3D scene –Components			

and attributes **Lab:** 1.Making a logo using Objects 2. Design an Ice-cream Cone		
UNIT II	**MODELING**	**9+6**
Polygonal Modeling – Modeling a polygonal mesh – NURBS Modeling – revolving a curve to create a surface – Lofting screen to create surface – Subdivision surfaces – Modeling a subdivision surface **Lab:** 1. Use modeling methods for designing		
UNIT III	**RIGGING AND ANIMATION**	**9+6**
Key frames and graph editor - set driven key – path animation – Non linear animation – Inverse kinematics **Lab:** 1. Create simple animation 2. Rigging Simple Character		
UNIT IV	**CHARACTER SET UP AND TEXTURING**	**9+6**
Skeleton and kinematics – smooth skinning – cluster and blend shape deformers - UV texture mapping **Lab:** 1. Applying texturing to the Objects 2. Using fluid dynamics		
UNIT V	**RENDERING AND DYNAMICS**	**9+6**
Rendering a scene – shading surfaces – lights shadows and cameras – Global Illumination – caustics- Particles emitter and fields - Rigid bodies and dynamics. **Lab:** 1. Designing simple animation using particles and dynamics		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	0	30	0	75

REFERENCES:

1. Getting started with Maya, Autodesk Maya 2011
2. The Animator's Survival Kit: A Manual of Methods, Principles, and Formulas for Classical, Computer, Games, Stop Motion, and Internet Animators by Richard Williams
3. Oliver Villa, "Learning Blender: A Hands-On Guide to Creating 3D Animated Characters", Second Edition, Addition Wesley Learning, 2014.

WEB REFERENCES:

1. www.creativebloq.com/3d-tips/maya-tutorials-1232745
2. www.cdschools.org/cdhs/site/default.asp.
3. www.animationmentor.com/tutorials/free-maya-basic-animation-tutorials.html
4. www.blenderartists.org

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	2	2	1	2	1	1	2	1
CO2	1	1	1	2	2	2	1	1	1
CO3	1	2	2	2	1	1	2	1	1

CO4	1	2	1	2	2	1	1	2	1
CO5	2	1	3	2	2	1	1	2	1
AVG	**1**	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**1**

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

XAM404			**FUNDAMENTALS OF CINEMATOGRAPHY**	**L**	**T**	**P**	**SS**	**C**
				3	**0**	**1**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
				3	**0**	**2**	**0**	**5**
2.0	**0.6**	**0.4**						

PREREQUISITE: Audio and Video Editing

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Describe and Express*** basic concepts in photography.	Cognitive	Remember Understand
CO2	***Identify and Interpret*** fundamentals of cinematography.	Cognitive	Remember Understand
CO3	***Compose and Formulate*** various photographs and videos	Psychomotor Affective	Origination Organization
CO4	***Identify and Explain*** the responsibilities of crew members in a camera department.	Cognitive	Knowledge Evaluation
CO5	***Initiate and Organize a*** screen play and shoot a short film.	Psychomotor Affective	Origination Organization

UNIT I	**FUNDAMENTALS OF CINEMATOGRAPHY**	**9+6**

What is cinematography - Persistence of vision – Frame rate – Intermittent mechanism – reflex viewfinder – Viewing screens – Film magazine – Film and digital camera layout. What is film – history – Photographic process – colour negative film – grain and graininess.

Lab : Shooting at various frame rates.

UNIT II	**LENSES AND DIGITAL CAMERA**	**9+6**

Lenses : Aperture and f – numbers – depth of field – how depth of field works – Depth of focus – lens care - **Cameras using film** – Essential components – Camera types –How view camera works –How direct viewfinder camera works –How reflex camera works - **Digital Camera** – overview how images are captured –film verses digital imaging routes – CCD limits to your final print size -Storing exposed shots on memory cards disk – point and shoot low end camera – high end camera shoots.

Lab : Shooting with various lens and focal lengths

UNIT III	**LIGHTING PRINCIPLES AND FILM PROCESSING**	**9+6**

Lighting principles and equipments- Basic characteristics of lighting – lighting equipment – Practical lighting problems - **Film Processing** – Equipments and general preparation – Processing black and white negatives –Processing chromomeric – **Digital image manipulation** Hardware -software programs – learning the ropes –working on pictures.

Lab : Shooting indoor and outdoor with various lighting techniques

UNIT IV	**COLOUR TEMPERATURE AND CAMERA FILTERS**	**9+6**

What is colour temperature – filters and mired shift values – the colour temperature meter – colour film – correction lamp – white balance - **Filters –** Colour compensation filters – colour

correction filters – skin tone warmer –colour effects – various kinds of filters.
Lab : Shooting with various white balances in camera and using filters.

UNIT V	**PRINCIPLES AND OPERATIONS**	**9+6**

Director of photography- Camera Operator – First Assistant Camera man – Second Assistant Camera man – Loader – SD or HD video production- **Second Assistant Camera man** - Clapper loader- focus puller – crew protocol - Choosing and ordering expendable – Preparation of camera equipment - Preparation of camera truck – Preparation of dark room – Production – Magazine – slate – Post production – wrapping equipments.
Lab : Using various shots, angles and camera movements and create an advertisement.

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**0**	**30**	**0**	**75**

REFERENCES:

1. Michale Langford "Basic Photography",FocalPressOxford Auckland Boston Johannesburg Melbourne New Delhi (UNIT : I, II and III)
2. David E Elkins , "The Camera Assistant's Manual "Focal PressOxford Auckland Boston Johannesburg Melbourne New Delhi (UNIT : IV and V)
3. David Samuelson,2009 , "Motion Picture Camera Techniques"
4. Verne Carlson,2003 ,"The Professional Lighting Handbook"
5. Blain Brown,2003,"The Filmmakers Pocket Reference"

WEB REFERENCES:

1. https://www.learnaboutfilm.com/film-language/picture/
2. https://www.premiumbeat.com/blog/cinematography-manual-the-ultimate-guide-to-becoming-a-director-of-photography/
3. https://www.viterbo.edu/sites/default/files/201902/Basic%20Filmmaking%20Concepts_0.pdf

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	3	2	2	1	1	1	2
CO2	2	2	3	2	2	1	1	1	2
CO3	2	1	2	1	1	1	1	1	2
CO4	1	1	1	2	1	2	2	1	2
CO5	3	2	2	3	3	1	1	1	2
AVG	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**2**

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

XAM406			ONLINE CONTENT CREATION	L	T	P	SS	C
				0	0	0	1	1
C	P	A		L	T	P	SS	H
				1	0	0	0	1
1.5	1.5	0						

PREREQUISITE:

COURSE OUTCOMES:

Course Outcomes	Domain	Level
After the completion of the course, students will be able to		
CO1: Describe and **Show** the various steps in blog creation using wordpress	Cognitive Psychomotor	Understand
CO2: **Apply** the principles, techniques to develop color schemes for blog creation and Styling for Print	Cognitive Psychomotor	Apply
CO3: Createcomprehensive list ofdesign articles and Adding a Favicon in blogs	Cognitive Psychomotor	Create

SYLLABUS:

Introduction to Blogging, First Steps With WordPress, WordPress Semantics - Learning the Jargon, New To WordPress - Where to Start, Using Images, Wrapping Text Around Images, Comments in WordPress, Finding WordPress Help, Post Formats, Linking to Posts, Pages, and Categories, Using Smilies, Links Manager, WordPress Feeds, Customizing Feeds, How to Use Gravatars in WordPress, Writing Code in Your Posts, Using Password Protection.

Developing a Colour Scheme, Designing Headers, CSS Horizontal Menus, Dynamic Menu Highlighting, Good Navigation Links, Next and Previous Links, Styling for Print, Designing Your Post Meta Data Section, Separating Categories in your Post Meta Data Section, Customizing the Read More, Formatting Date and Time, Styling Lists with CSS, Designing Headings, Playing With Fonts, Using Images, Fun Character Entities, Comprehensive list of design articles, Adding a Favicon.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
15	0	0	15

REFERENCES:

1. Michael David - WordPress Search Engine Optimization – PACKT publisher, 2015

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	2	3	2	2	1	1	1	2
CO2	2	2	3	2	2	1	1	1	2
CO3	2	1	2	1	1	1	1	1	2
AVG	2	2	2	2	2	1	1	1	2

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

XAM 501			WEB DESIGN	L	T	P	C
				3	0	1	4
C	P	A		L	T	P	H
3	1	0		3	0	2	5

PREREQUISITE: Nil

	COURSE OUTCOMES	DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Web Technology.	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the knowledge on HTML, CSS and JavaScript in Web Design.	Cognitive	Understand
CO3	***Employ*** the understanding of the Client side scripts and actively ***participate*** in teams for the creation of web pages.	Cognitive Affective	Apply Respond
CO4	***Utilize*** the web designing tools effectively in the real world applications.	Cognitive	Apply
CO5	***Design***and***Establish*** the Website.	Cognitive Psychomotor	Create Set

UNIT I	INTRODUCTION TO WEB TECHNOLOGY	9+6

Basics of Internet – World Wide Web – Web Server – Proxy Server – Web Browsers – IP Address – Domain Name – HTTP – Uniform Resource Locator – Concept of Tier – Web Pages – Static Web Pages – Dynamic Web Pages – Search Engine – Search Tools.

Lab:1. Usage of Microsoft Interdev.
2. Downloading Templates.

UNIT II	HTML	9+6

HTML Basics – HTML Editor – HTML CSS – Links – Images – Tables – Lists - Frames - HTML forms and Input tags.

Lab:1. Formatting tags, ordered list and unordered list.
2.Tables, frame, image map and hyperlink.

UNIT III	CSS	9+6

CSS Basics – Texts and Fonts – Links, Lists and Tables – Background, Border and Outline – Position – Dimension and Display.

Lab:1.Font, color and style
2. Background and Links

UNIT IV	JAVASCRIPT	9+6

Java Script Basics – Functions – Objects – Events – Scope – Strings – Numbers – Date – Arrays – Conditional and Looping Statements – Forms.

Lab:1.Form Validation
2. Looping and Conditional Statements

UNIT V	WEB APPLICATIONS	9+6

Free Website Creation – Getting Server Space - Case Studies: College Website – Blog Creation – Online Education – Career Guidance.

Lab: Website Creation

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	-	30	75

REFERENCES:

5. AchyutS.Godbole, AtulKahate, "Web Technologies TCP/IP To Internet Application Architectures", First Edition, Tata McGraw-Hill Publishing Company Limited, 2003.
6. N.P. Gopalan, J.Akilandeswari, "Web Technology: A Developer's Perspective", Second Edition, PHI Learning Private Limited, 2014.
7. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2010.
8. Thomas A. Powell, Fritz Schneider, "JavaScript: The Complete Reference", Second Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2008.
9. www.w3schools.com
10. www.tutorialspoint.com

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO						PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	0	1	0	1	0	1	0	0
CO2	2	2	1	1	0	1	1	0	0
CO3	1	2	1	2	1	1	2	0	0
CO4	0	1	2	2	1	0	1	0	0
CO5	1	2	2	3	2	1	1	0	0
AVG	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**0**	**0**

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

XAM502A			3D MODELLING	L	T	P	C
				3	0	1	4
C	P	A		L	T	P	H
3	1	0		3	0	2	5

PREREQUISITE: 3D Animation

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Understand***the definition ofComputer Based Animation and Modeling. Experiment with the geometrical 2D and 3D shapes.	Cognitive Psychomotor	Understand Remember

CO2	***Understand and Apply*** 2Dmodeling in simple objects with lines and connect with compound objects.	Cognitive	Understand Remember Apply
CO3	***Design***3D modeling with 3d objects.	Cognitive Psychomotor	Apply Respond
CO4	***Identify*** different types of lighting and cameras and Apply in real world application.	Cognitive	Remember Apply
CO5	***Creating and Applying*** standard materials, adding material details with maps, creating compound materials.	Cognitive Psychomotor	Create organization

UNIT I	**COMPUTER-BASED ANIMATION**	**9+6**

Definition of Computer-based Animation, Basic Types of Animation: Real Time ,Non-real-time,
Definition of Modeling, Creation of 3D objects. Exploring the Max Interface, Controlling & Configuring the Viewports, Customizing the Max Interface & Setting Preferences, Working with Files, Importing & Exporting, Selecting Objects & Setting Object Properties, Duplicating Objects, Creating & Editing Standard Primitive & extended Primitives objects, Transforming objects, Pivoting, aligning etc.

Lab:

1. Introduction to 3D Studio Max.
2. Exploring the Max Interface
3. Creating & Editing Standard Primitive Objects

UNIT II	**2D SPLINES & SHAPES& COMPOUND OBJECT**	**9+6**

Understanding 2D Splines& shape, Extrude & Bevel 2D object to 3D, Understanding Loft & terrain, Modeling simple objects with splines, Understanding morph, scatter, conform, connect compound objects, blobmesh, Boolean , Pro-boolean& pro-cutter compound object.

Lab:

1. 2D Splines, Shapes & Compound Objects.
2. Understanding 2D Splines & Shape
3. Convert 2D to 3D object using extrude, bevel, loft, terrain etc.

UNIT III	**3D MODELLING**	**9+6**

Modeling with Polygons, using the graphite, working with XRefs, Building simple scenes, Building complex scenes with XRefs, using assets tracking, deforming surfaces & using the mesh modifiers, modeling with patches & NURBS

Lab:

1. 3D Modeling
2. Modeling with polygon objects
3. Building Simple & Complex Scene

UNIT IV	**LIGHTING & CAMERA**	**9+6**

Configuring & Aiming Cameras, camera motion blur, camera depth of field, camera tracking, using basic lights & lighting Techniques, working with advanced lighting, Light Tracing, Radiosity, video post, mental ray lighting etc.

Lab:

1. Lighting & Camera
2. Configuring & Aiming Cameras
3. Using Camera Motion Blur & Depth of Field

UNIT V	**TEXTURING**	**9+6**

Using the material editor & the material explorer, creating & applying standard materials, adding material details with maps, creating compound materials & material modifiers, unwrapping UVs & mapping texture,

using atmospheric & render effects etc.

Lab:

1. Texturing with Max
2. Using Material Editor
3. Create & Apply standard material
4. Material Modifier

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	-	30	60

REFERENCES:

1. TedBoardman, 3d'sMax5Fundamentals, Techmedia"2004,
2. Michele Busquet, Modeling, Animate with 3d'smax6, "Many world, 2006.
3. Michael E. Mortenson, 3D Modeling, Animation, and Rendering, Create space,2010.
4. Boris Kulagin, "3ds Max 8 from Modeling to Animation, BPB,2006.
5. Michael G., 3D Modeling and Animation, IRM Publishing,2005
6. Lance Flavell, Beginning Blender: Open Source 3D Modeling, Animation, and Game Design, Apress, 2010.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	2	2	2	1	1	2	2
CO2	2	3	3	3	3	1	1	3	2
CO3	2	3	3	3	3	1	1	3	2
CO4	2	3	3	3	3	1	1	3	2
CO5	2	3	3	3	3	1	1	3	2
AVG	**2**	**3**	**3**	**3**	**3**	**1**	**1**	**3**	**2**

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

XAM503A			SCRIPT WRITING AND STORY BOARD DESIGNING	L	T	P	C
				3	0	1	4
C	P	A		L	T	P	H
3	1	0		3	0	2	5

PREREQUISITE:Nil

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Script writing.	Cognitive	Remember
CO2	***Express*** the different ways of Story preparation in Script.	Cognitive	Understand

CO3	***Employ*** the understanding of the Writing skills in Story board designing.	Cognitive	Apply
CO4	***Utilize*** the various advertising methods effectively in making the realistic shooting spot.	Cognitive	Apply
CO5	***Design***and ***Draw*** the story board writing using different types of subjects.	Cognitive Psychomotor	Create Set

UNIT I	**SCRIPT**	**9+6**

Script: concept, forms and utility, Basic principles of writing a script -Importance of script writing.

Lab:

Script for a short film

UNIT II	**STORY**	**9+6**

Writer and Producer- Researching the script -Story Development ,Plots in script.

Lab:

Story Board for a comic story

UNIT III	**WRITING**	**9+6**

Descriptive writing ,Analytical writing -Writing fiction - Writing script for video programmes, Concept of Shooting Script.

Lab:

Script - film review

UNIT IV	**ADVERTISING**	**9+6**

Script writing for theatre, Script writing for Advertising -Script writing for planetarium.

Lab:

Script and story board for a given situation

UNIT V	**STORY BOARD**	**9+6**

Introduction to Storyboard- Parts of storyboard --Advantages of storyboarding

Interactive Storyboarding -Designing of Storyboard exercise.

Lab:

Screen play

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	**-**	**30**	**75**

REFERENCES:

1. Chawdhary, Nirmalkumar, How to write film screenplay, Kanishka publishers, distributers, New Delhi- 110002,– 2009,ISBN 978-81-8457-112-7.

2. Rubenstein, Paul Max, Martin Jo Maloney, Writing For the Media, Film Television, Video And Radio, Prentive Hall,– Englewood Clifts, New Jersey 07632, 1988, ISBN: 0-13-971508-7-01

3. Whitaker, Harold, John Halas, Updated by Tom Sito, Timing for Animation, Focal Press Elsevier, New York & Singapore, 2009 ISBN: 978-0-240-52160-2.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO								PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**
CO1	3	2	3	2	2	1	2	1	1	2
CO2	2	3	2	2	1	2	0	0	1	1
CO3	2	2	3	1	2	1	1	2	2	3
CO4	3	2	1	3	1	2	2	1	1	1
CO5	2	1	3	2	0	1	1	2	2	3
AVG	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**2**

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

XAM504B			**MEDIA TECHNOLOGIES**	**L**	**T**	**P**	**C**
				3	**1**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**H**
4	**0**	**0**		**3**	**1**	**0**	**4**

PREREQUISITE: Nil

	COURSE OUTCOMES	**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the concept of media production and the process and technically know-how.	Cognitive	Remember
CO2	***Illustrate*** and communicate ideas in the form of production in various media.	Cognitive	Analysis
CO3	***Create*** and communicate ideas visually in the form of media.	Cognitive	Create
CO4	***Understand*** the basic of production in print, radio, television and internet media.	Cognitive	Understand
CO5	***Examine*** the basic knowledge about media production.	Cognitive	Apply

UNIT I	**INTRODUCTION**	**12**
Various types of media - Paper, Television, Radio and Internet – History of media.		
UNIT II	**PRINT MEDIA**	**12**
Print media professional designing tools for News paper, magazine, brochures, advertisements, booklets, business cards, book covers- Image and text effects.		
UNIT III	**RADIO MEDIA**	**12**
How radio broadcasting works, radio studio, radio programme formats, radio play documentary, news, interviews, discussions, writing for radio, editing for radio.		
UNIT IV	**TELEVISION MEDIA**	**12**
Television production process, Electronic news gathering, basic steps of production, script writing and editing principles.		
UNIT V	**INTERNET MEDIA**	**12**
Internet – e-books, e-magazines, portals, web advertisements.		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	**15**	**-**	**60**

REFERENCES:

1. Charles convonor, Designing for Print, Second Edition,John Wiley & Sons
2. Gorham Kindem and Robert B.Musburger, Introduction to Media Production: The path to digital production, Elsevier publication 2009
3. Lynnee Schafer Gross, Electronic Media Introduction, McGraw Hill, 2009
4. https://en.wikipedia.org/wiki/Media_(communication)
5. https://www.studyblue.com/notes/b/media-and-culture-an-introduction-to-mass-communication

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	3	2	1	1	2	1	2
CO2	2	2	2	1	1	1	2	1	2
CO3	2	1	2	1	1	1	2	1	1
CO4	3	2	3	2	1	1	2	1	2
CO5	2	2	2	1	1	1	2	1	2

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

XAM601			DIGITAL TELEVISION PRODUCTION	L	T	P	C
				0	0	2	2
C	P	A		L	T	P	H
1	1	0		0	0	4	4

PREREQUISITE: Compositing

COURSE OUTCOMES:

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1:	***Recognize*** about the digital media.	Cognitive	Remember
CO2:	***Summarize*** the shooting progress	Cognitive	Understand
CO3:	**Identify** the editing and sharing in movies.	Cognitive	Understand
CO4:	***Implementing*** the advanced in movies.	Cognitive	Understand
CO5:	***Experimenting*** the movie maker tools to create the quality in movies.	Cognitive	Create

UNIT I **INTRODUCTION** **12**

Digital media – Idea of Movie creation – Preproduction – Planning - story script - Production – Shooting progress – Post production – introduction to Movie maker.

Lab

1. Installing movie maker

UNIT II **SHOOTING PROGRESS** **12**

Director – Assistant Producer – Production Manager – basic camera work - three way shooting – lighting – trailer preparation. – organize your clips

Lab

1. Capture video from device.
2. Organize the videos from the movie maker

UNIT III **EDITING AND SHARING** **12**

Adding – arranging – splitting – trimming – combining – Edit audio tracks – Narration recording – Adjust – Save your movie – sharing

Lab

1. Splitting videos
2. Adding audio
3. Finish your movie

UNIT IV **ADVANCED IN MOVIE** **12**

Working with still images – Adding sound effect – video transition – Video Effects

Lab

1. Video transition
2. Video effects

UNIT V **PLAYING MOVIES** **12**

Playing with movies – audacity – creating movie with quality sound effects – creating skins for videos.

Lab:

1. Create skin for videos.
2. Audacity for narration for quality sound.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
-	-	60	60

REFERENCES:		

1. Digital Television Production, Jeremy orleber, 2002, Arnold publishing.
2. Television production Handbook, Herbert zettl, 11 edition, Wordsworth, cengage learning 2006.
3. Microsoft windows movie maker handbook, John M'Chalak, Seth McEvoy.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	2	1	1	1
CO2	3	2	2	2	2	2	2	2	1
CO3	2	2	2	2	3	2	2	2	1
CO4	3	2	2	2	2	2	2	3	1
CO5	3	3	3	3	3	3	3	3	1
AVG	3	2	2	2	2	2	2	2	1

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

XAM 602			3D ANIMATION	L	T	P	C
				3	0	1	4
C	P	A		L	T	P	H
3	1	0		3	0	2	5

PREREQUISITE: 2D Animation

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of 3D animation basics.	Cognitive Psychomotor	Remember Perception
CO2	***Observe*** and ***Express*** the knowledge on using different modeling techniques in designing 3D animation.	Cognitive Psychomotor	Understand Perception
CO3	***Listen*** and ***Employ*** the animated objects and manipulate rigging the objects.	Cognitive Psychomotor Affective	Apply Perception Response
CO4	***Utilize*** texturing methods to ***improve*** the designing character for the realistic applications.	Cognitive Psychomotor Affective	Apply Mechanism Respond
CO5	***Design*** and ***Establish*** the lighting, shadow and camera for shading the surface and improve the performance by using dynamics.	Cognitive Psychomotor	Create Originate

UNIT I	INTRODUCTION	9+6

User Interface – Creating, Manipulating and viewing objects- viewing 3D scene –Components and attributes

Lab:

1.Making a logo using Objects

2. Design an Ice-cream Cone

UNIT II	MODELING	9+6

Polygonal Modeling – Modeling a polygonal mesh – NURBS Modeling – revolving a curve to create a surface – Lofting screen to create surface – Subdivision surfaces – Modeling a subdivision surface

Lab:

1. Use modeling methods for designing

UNIT III	RIGGING AND ANIMATION	9+6

Key frames and graph editor - set driven key – path animation – Non linear animation – Inverse kinematics

Lab:

1. Create simple animation
2. Rigging Simple Character

UNIT IV	CHARACTER SET UP AND TEXTURING	9+6

Skeleton and kinematics – smooth skinning – cluster and blend shape deformers - UV texture mapping

Lab:

1. Applying texturing to the Objects
2. Using fluid dynamics

UNIT V	RENDERING AND DYNAMICS	9+6

Rendering a scene – shading surfaces – lights shadows and cameras – Global Illumination – caustics- Particles emitter and fields - Rigid bodies and dynamics.

Lab:

1. Designing simple animation using particles and dynamics

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	-	30	75

REFERENCES:

1. Getting started with Maya, Autodesk Maya 2011
2. The Animator's Survival Kit: A Manual of Methods, Principles, and Formulas for Classical, Computer, Games, Stop Motion, and Internet Animators by Richard Williams
3. Oliver Villa, "Learning Blender: A Hands-On Guide to Creating 3D Animated Characters", Second Edition, Addition Wesley Learning, 2014.
4. www.creativebloq.com/3d-tips/maya-tutorials-1232745
5. www.cdschools.org/cdhs/site/default.asp.
6. www.animationmentor.com/tutorials/free-maya-basic-animation-tutorials.html
7. www.blenderartists.org.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	2	2	1	2	1	1	2	1
CO2	1	1	1	2	2	2	1	1	1
CO3	1	2	2	2	1	1	2	1	1

CO4	1	2	1	2	2	1	1	2	1
CO5	2	1	3	2	2	1	1	2	1
AVG	**1**	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**1**

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

XAM603A			**FILM MAKING**	**L**	**T**	**P**	**C**
				3	**0**	**1**	**4**
C	**P**	**A**		**L**	**T**	**P**	**H**
3	**1**	**0**		**3**	**0**	**2**	**5**

PREREQUISITE: 2D Animation, 3D Animation

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Observe*** the basics of Animation and ***Perceive*** the process of Film Making.	Cognitive Psychomotor	Remember Perception
CO2	***Interpret*** the knowledge on Pre Production activity.	Cognitive	Understand
CO3	***Employ*** the understanding of Production activity	Cognitive	Apply
CO4	***Utilize*** the awareness of Post Production activity and ***Achieve*** the good quality in the Pre Production, Production and Post Production of Film Making.	Cognitive Psychomotor	Apply Set
CO5	***Contribute*** more actions in ***Design***ingthe Animated Movie.	Cognitive Affective	Create Respond

UNIT I	**ANIMATION BASICS – I**	**9+6**

The Bouncing Ball – Generic Walks – Personality Walks – Generic Runs –Key Generic Run Stages – Additional Pointers for Runs – Head-on Runs – Quadruped Walks – Weight – Standard Rubber Ball – Ping-Pong Ball – Bowling Ball – Comparing the three versions.

Lab:
1.Making a Motion tween and shape tween using Simple Objects
2. Create a Bouncing ball.

UNIT II	**ANIMATION BASICS – II**	**9+6**

Anticipation – The Benefits of Anticipation – Anticipations are for everything - Dialog – Body Language – Facial Animation - Lip Synching – Two-Character Dialog – Final Project – Staggers – Successive Breakouts of Joints – Eye Blinks – Eyebrows.

Lab:
1.Anticipation method using Simple Character.
2. Create a Character design and dialog.

UNIT III	**ANIMATED FILM PRODUCTION – I**	**9+6**

Production Challenge – Exploring Ideas, Storytelling and Scriptwriting – Concept Art, Viz Dev and Camera Maps – Character Design – Thumbnails – Storyboards.

Lab:

1. Storyboard drawings.
2. Create a Concept art.

UNIT IV	**ANIMATED FILM PRODUCTION – II**	**9+6**

Filmmaking Techniques – Audio Record – Animatic and Bacher Boards – Backgrounds and Environment Layouts – Color Script – Audio Breakdown – Block in Key Poses - Placement and Timing.

Lab:

1.Create a background layout and designing .
2. Create a Animatics Drawing.

UNIT V	**ANIMATED FILM PRODUCTION – III**	**9+6**

Two-Dimensional In-Betweening – Rolling, Flipping and Pencil Testing – Clean-up – Scanning – Background and Environments – Coloring – Compositing – Rendering – Final Edit.

Lab:

1.Walk Cycle in Simple Character.
2. Advertisement or Story in 2d animation. (30 seconds duration)

LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
45	**-**	**30**	**75**

REFERENCES:

1. Tony White, How to make animated films, Focal Press, Elesvier, 2009.
2. Kit Laybourne, The Animation Book: A complete guide to animated film making – from flip-books to sound cartoons to 3D animation, Crown Publishing Group, 1998.
3. Mark Simon, Producing Independent 2D Character Animation: Making and Selling a Short Film, Focal Press, Elesvier, 2003.
4. https://en.wikibooks.org/wiki/Movie_Making_Manual

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	1	0	3	0	1	1	2	3	0
CO2	1	2	0	1	1	0	1	0	2
CO3	1	2	0	2	1	0	1	0	2
CO4	1	2	0	1	3	1	1	0	2
CO5	2	3	2	2	3	2	1	1	0
AVG	**1**	**2**	**1**	**1**	**2**	**1**	**1**	**1**	**1**

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

XAM604B			TEXTURING AND SHADING	L	T	P	C
				3	0	1	4
C	P	A		L	T	P	H
3	1	0		3	0	2	5

PREREQUISITE: Rigging, Lighting & Rendering and 3D Animation

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Light colour.	Cognitive	Remember
CO2	***Express*** the different ways light types for shading	Cognitive	Understand
CO3	***Employ*** the understanding of the lights and shadows.	Cognitive	Apply
CO4	***Utilize*** the various texturing methods.	Cognitive	Apply
CO5	***Design*** and ***Draw*** the 3D Projections	Cognitive Psychomotor	Create Set

UNIT I	UNDERSTANDING LIGHTING, COLOR, AND COMPOSITION	9+6

Understanding the Art of Lighting- 1-Point Lighting, 2 -Point Lighting, 3-Point Lighting, Understanding Color and Composition- Color Theory, Checking Color Calibration, Color Temperature, Setting a White Point, Applying the Golden Mean, Rule of Thirds.

Ex:

1.Introduction about Maya, Photoshop

2.Create a simple model using maya

UNIT II	APPLYING THE CORRECT MAYA LIGHT TYPE	9+6

Maya Light Types- Using Spot Lights, Directional Lights, Ambient Lights, Point Lights, Using Area, Volume Lights. Linking and Unlinking Lights, Light Fog and Light Glow, Environment and Volume Fog, Chapter Tutorial: Lighting an Interior.

Ex:

1.Create a texture using photoshop

2.Apply a texture to a model

UNIT III	CREATING HIGH-QUALITY SHADOWS	9+6

Rendering Depth Maps, Understanding Depth Maps , Refining Depth Maps ,Solving Light Gap Errors ,Comparing Shadows, Raytracing Shadows, Linking and Unlinking Shadows, Creating Effects Shadows, Shadowing with Light Fog, Shadowing with Paint Effects. Shadowing with Maya- Fur, in Cloth, the Toon System. Chapter Tutorial: Lighting a Flickering Fire Pit with Shadows.

Ex:

1.Create a soda bottle model and apply texture

UNIT IV	APPLYING THE CORRECT MATERIAL AND 2D TEXTURE	9+6

Reviewing Shading Models and Materials-Lambert ,Shading with Phong ,Shading with Blinn , Shading with Phong E , Shading with the Anisotropic Material ,Shading with a Shading Map , Shading with a Surface Shader , Shading with Use Background.Reviewing 2D Textures-Applying Cloth , Applying Water , Applying Perlin Noise , Applying Ramps, Bitmaps, and Square Textures.Mastering Extra Map Options , Setting the Filter Type ,Shifting Color with Invert and Color Remap , Stacking Materials and Textures , Mastering the Blinn Material -Re-Creating Wood , Re-Creating Metal , Re-Creating Plastic.Chapter Tutorial: Re-Creating Copper with Basic Texturing Techniques.

Ex:

1. Unwrap a text and apply a texture, shading.
2. Unwrap human hand and add texture.

UNIT V	APPLYING 3D TEXTURES AND PROJECTIONS	9+6

Exploring 3D Textures- Applying Random Textures, Natural Textures, Granular Textures, Abstract Textures, and Environment Textures. 2D Texture Projection Options, Placing Placement Boxes and Projection Icons, Convert To File Texture Tool, Chapter Tutorial: Creating Skin with Procedural Textures.

Ex:

1.Unwrap human Head and whole human body then add texture, shading.
2,Create a model house unwrap and apply texture & shading.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	-	30	75

REFERENCES:

1. Lee Lanier “Advanced Maya Texturing and Lighting” Autodesk Maya Press, Second Edition, United Kingdom.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. A&M	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	3	2	2	1	2	1	2
CO2	2	3	2	2	1	2	0	1	1
CO3	2	2	3	1	2	1	1	2	3
CO4	3	2	1	3	1	2	2	1	1
CO5	2	1	3	2	0	1	1	2	3
AVG	**2**	**2**	**3**	**2**	**1**	**1**	**1**	**1**	**2**

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

B.Sc (Artificial Intelligence)

Course Code		L	T	P	C
Course Name	அடிப்படைத் தமிழ்- I	3	0	0	3
Prerequisite		L	T	P	H
C:P:A	3:0:0	3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	உயிர் எழுத்துக்கள் - மெய்யெழுத்துகள் வகைப்படுத்தி நினைவூட்டல்.	Cognitive	Remember
CO2	உடல் உறுப்புப் பெயர்கள் - எளிய சொற்களை தொகுத்துக் கூறுதல்	Cognitive	Remember
CO3	ஒலி வேறுபாடுளைப் புரிந்து கொள்ளும் திறன் பெறல்	Cognitive	Understand
CO4	தமிழில் உரையாடல் - இயற்கையை வருணித்தல்.	Cognitive	Apply
CO5	அறநெறிக் கருத்துக்களை வகைப்படுத்தும் திறன் பெறல்.	Cognitive	Analyze

அலகு– 1	எழுத்துக்களின் வகைகள்	9
உயிர் எழுத்துக்கள் - மெய்யெழுத்துகள் - பிரித்து எழுதுதல் - சேர்த்து எழுதுதல் - பொருள் விளக்கம் அறிதல்		
அலகு– 2	எளிய தமிழ்ச் சொற்களை வகைப்படுத்துதல்	9
உடல் உறுப்புப் பெயர்கள் - எளிய தமிழ்ச் சொற்கள் வகைப்படுத்துதல்		
அலகு– 3	ஒலி வேறுபாட்டுத் திறன்	9
ஒலி வேறுபாடுகள் - சொல் வகைகள்		
அலகு– 4	உரையாடல்	9
தமிழில் உரையாடல் - இயற்கையைப் பற்றி அறிதல் - வருணனை செய்தல்		
அலகு– 5	அறநெறிக் கருத்துக்களைப் பின்பற்றுதல்	9
விழாக்கள் - அறநெறிக் கதைகள் - பிழையின்றிப் படித்தல், எழுதுதல்		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	---	---	45

பாடநூல்கள்:

1. முனைவர் கோ.பெரியண்ணன் - அடிப்படை எளிய தமிழ் இலக்கணம் -2003, வனிதா பதிப்பகம், 11, நானா தெரு, பாண்டி பஜார், தி.நகர், சென்னை - 17.
2. முனைவர் ந.லெனின் - பிழையின்றித் தமிழை எழுதுக (எளியமுறை) சூன்-2020, பிருந்தா பதிப்பகம், தஞ்சாவூர் - 05.

பார்வை நூல்கள்:

1. தமிழ்நாடு அரசு வெளியிட்டுள்ள தமிழ்ப் பாட நூல்கள், வகுப்பு - 6, 7, 8.

COURSE CODE	XGE102	L	T	P	SS	H	C
COURSE NAME	English - I	3	0	0	0	3	3
C:P:A - 3:0:0							

COURSE OUTCOMES:		Domain	Level
CO1	***Recall*** the basic grammar and using it in proper context	Cognitive	Remembering
CO2	***Explain*** the process of listening and speaking	Cognitive	Understanding
CO3	***Adapt*** important methods of reading	Cognitive	Creating
CO4	***Demonstrate*** the basic writing skills	Cognitive	Understanding

SYLLABUS		HOURS
UNIT I	**Grammar**	
i. Major basic grammatical categories ii. Notion of correctness and attitude to error correction		9
UNIT II	**Listening and Speaking**	
iii. Importance of listening skills iv. Problems of listening to unfamiliar dialects v. Aspects of pronunciation and fluency in speaking vi. Intelligibility in speaking		9
UNIT III	**Basics of Reading**	
vii. Introduction to reading skills viii. Introducing different types of texts – narrative, descriptive, extrapolative		9
UNIT IV	**Basics of Writing**	
ix. Introduction to writing skills x. Aspects of cohesion and coherence xi. Expanding a given sentence without affecting the structure xii. Reorganizing jumbled sentences into a coherent paragraph xiii. Drafting different types of letters (personal notes, notices, complaints, appreciation, conveying sympathies etc.)		9
	Total Hours	**36**

Text books

1. Acevedo and Gower M (1999) Reading and Writing Skills. London, Longman
2. Deuter, M et.al. (2015). Oxford Advanced Learner's Dictionary of English (Ninth Edition). New Delhi, OUP
3. Eastwood, John (2008). Oxford Practice Grammar. Oxford, OUP
4. Hadefield, Chris and J Hadefield (2008). Reading Games. London, Longman
5. Hedge, T (2005). Writing. Oxford, OUP
6. Jolly, David (1984). Writing Tasks: Stuidents' Book. Cambridge, CUP
7. Klippel and Swan (1984). Keep Talking. Oxford, OUP
8. Saraswati, V (2005). Organized Writing 1. Hyderabad, Orient Blackswan

9. Swan, Michael. (1980). Practical English Usage. Oxford, OUP

10. Walter and Swan (1997). How English Works. Oxford, OUP

Table 1: Mapping of Cos with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO2	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO3	1	0	0	0	0	0	1	0	1	0	0	0	0	0
CO4	2	0	0	0	0	0	1	0	1	0	0	0	0	0
Total	7	0	0	0	0	0	6	0	4	0	0	0	0	0
Scaled Value	2	0	0	0	0	0	2	0	1	0	0	0	0	0
	1	0	0	0	0	0	1	0	1	0	0	0	0	0

1-5= 1, 6-10 = 2, 11-15= 3

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

Table 2: Mapping of COs with GAs:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	0	0	0	0	0	0	0	1	1	2	0	0
CO2	0	0	0	0	0	0	0	0	0	2	0	0
CO3	0	0	0	0	0	0	0	0	0	1	0	0
CO4	0	0	0	0	0	0	0	0	0	0	1	0
Total	0	0	0	0	0	0	0	1	1	5	2	0
Scale	0	0	0	0	0	0	0	1	1	1	1	0

1-5= 1, 6-10 = 2, 11-15= 3

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

XAI103-PROGRAMMING METHODOLOGIES

Sub Code	**PROGRAMMING METHODOLOGIES**	**L**	**T**	**SS**	**C**
		4	**1**	**0**	**5**
XAI 103		**L**	**T**	**SS**	**H**
		4	**1**	**0**	**5**

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
CO1	***Recognize*** the importance of developing simple algorithms and flow charts to solve a problem.	Cognitive Psychomotor	Remember Perception
CO2	***Identify*** the needs problem solving skills coupled with top down design principles.	Cognitive Psychomotor	Understand Perception
CO3	***Demonstrate*** the strategies of array processing algorithms coupled with iterative methods.	Cognitive Psychomotor Affective	Apply Perception Receive

CO4	***Illustrate*** the concept of Structures application development.	Cognitive Psychomotor Affective	Apply Mechanism Respond
CO5	***Develop*** and ***Establish***searching techniques and use of pointers. recursive techniques in programming	Cognitive Psychomotor	Create Origination

UNIT I	**INTRODUCTION TO PROGRAMMING**	**12+3**

Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies, Introduction to C++ Programming - Basic Program Structure In C++, Variables and Assignments, Input and Output, Selection and Repetition Statements.

UNIT II	**FUNCTIONS**	**12+3**

Top-Down Design, Predefined Functions, Programmer -defined Function, Local Variable, Function Overloading, Functions with Default Arguments, Call -By-Value and Call-By-Reference Parameters, Recursion.

UNIT III	**ARRAYS**	**12+3**

Introduction to Arrays, Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi-Dimensional Arrays.

UNIT IV	**STRUCTURES**	**12+3**

Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures, Unions

UNIT V	**FILES AND SEARCHING ALGORITHMS**	**12+3**

Declaration and Initialization, Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions. Searching Algorithms - Linear Search, Binary Search. Use of files for data input and output. merging and copy files.

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

TEXT BOOKS

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.
2. Programming and problem solving with C++: brief edition, N. Dale and C. Weems, Jones & Bartlett Learning, 2010.

REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
2. Aho A.V. J.E. Hopcroft and J.D. Ullman., 2001. “The Design and Analysis of Computer Algorithms”, Pearson Education Delhi. Second Edition.

E-REFERENCES

1. http://www.comptechdoc.org/basic/basictut/index.html
2. http://cse02-iiith.vlabs.ac.in/
3. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106104128
4. http://www.nptel.ac.in
5. http://www.vlab.co.in

Table 1: Mapping of Cos with POs.

B.Sc AI	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	2	2				2	1
CO2	1			2				2	
CO3	1		2	1					
CO4	2	1	2	3				2	1
CO5	2		1	3				2	
Total	8	3	7	11				8	2
Scaled Value	2	1	2	3				2	1

1 -- 5 □ 1, 6-- 10 □ 2, 11--15 □ 3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

XAI 104			**ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY**	L	T	SS	C
				4	1	0	5
C	**P**	**A**		L	T	SS	H
4	0	0		4	1	0	5

PREREQUISITES	Basics of Mathematics		
COURSE OUTCOMES		**DOMAIN**	**LEVEL**
CO1	Evaluate the derivatives of given functions	Cognitive	Understand
CO2	Calculate the definite and indefinite integrals using various techniques.	Cognitive	Understand, Remember
CO3	Apply basic operations on matrices to find the inverse of a matrix	Cognitive	Understand, Apply
CO4	Solve problems using Binomial, exponential and logarithmic series expansions.	Cognitive	Understand
CO5	Calculate the distance between two points and explain section formulae, slope form and intercept form.	Cognitive	Understand

UNIT I – DIFFERENTIAL CALCULUS	**12+3**
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 – Leibnitz theorem.	
UNIT II – INTEGRAL CALCULUS	**12+3**
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	**12+3**
Definition and types of matrices – Matrix Operation – Determinants – Solution of system of linear equations by Matrix method.	
UNIT IV – SERIES	**12+3**
Binomial theorem for a rational index – Exponential and Logarithmic series – Summation of the above series.	
UNIT V – TWO-DIMENSIONAL ANALYTICAL GEOMETRY	**12+3**

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**	**SELF STUDY**	**PRACTICAL**	**TOTAL**
60	15	15	0	75+15

TEXT BOOKS

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

4. S.Naravanan, T.K.ManicavachagamPillay, S.Vishvanathan, Calculus volume I & IIPrinters and Publishers Pvt., Ltd, Chennai 1991.

REFERENCES

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

E- REFERENCES

www.nptel.ac.in

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

Mapping of COs with POs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**3**						**2**		
CO2	**3**						**2**		
CO3	**3**						**2**		
CO4	**3**						**2**		
CO5	**3**						**2**		
Total	**15**						**10**		
Scaled Value	**3**						**2**		

1-5→1, 6-10→2, 11-15→3

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

XAI 105			**PRINCIPLES OF STATISTICS**	**L**	**T**	**SS**	**C**
				3	**1**	**0**	**4**
C	**P**	**A**		**L**	**T**	**SS**	**H**
3				**3**	**1**	**0**	**4**

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
CO1	***Understand*** the nature and types of data	Cognitive	Knowledge Comprehension
CO2	***Build*** Data collection strategy using scraping	Cognitive Psychomotor	Understand Perception
CO3	***Build*** Statistical Models using Knime and Jasp	Cognitive Psychomotor	Application Evaluation

CO4	***Design Hypothesis and perform Hypothesis testing***	Cognitive Psychomotor	Application Synthesis Evaluation
CO5	***Develop*** *Estimation tools to model* ***Uncertainty***	Psychomotor Affective	Comprehension Application Evaluation

UNIT I	**FOUNDATIONS OF STATISTICS – HANDLING DATA**	**9+3**

What is Statistics – Role of Statistics in Modern Day Applications – Building Blocks of Statistics– What is Data analysis – Process of Data Analysis - Significance of Statistics in Data analysis– Nature of Variability – What is Data – Types of Data – Data Collection Methods – Observation and Experimentation – Scraping Web data – Statistical Procedures in Datacollection - Introduction to Knime – Installation of Knime – Understanding KnimeEnvironment – Extracting data from internet using Knime – Exploratory Data analysis usingKnime

UNIT II	**DESCRIPTIVE STATISTICS**	**9+3**

What is Descriptive Statistics – Graphical Methods for Describing Data – Bar Charts Pie Charts – Stem and Leaf Display – Frequency Distribution – Histogram – Working with Bivariate Numerical Data – Numerical methods for describing data - Measuring Centre – Mean – Median – Mode – Measuring Spread – Variance – Standard Deviation – Quantiles and standardized variables – Quantile – Quantile plots – Summarizing a dataset – Box plots – Interpreting center and variability – Chebyshev's Rule – Empirical rule - Summarizing Bivariate Data – Covariance – Correlation – Pearson Correlation – Kendall Rank Correlation – Spearman Correlation - Linear Regression – Nonlinear relationship and transformation

UNIT III	**INFERENTIAL STATISTICS**	**9+3**

What is Inferential Statistics – Terminology in inferential Statistics – Sample –Population – Statistic – Point Estimation – Interval Estimation – Normal distribution Theory – Checking for Normality and Normalizing transformation – Chi-squared Distribution – student t distribution - Classical central limit theory – Bernoulli trials – Sampling – What is sampling – Significance of Sampling in statistics – Random Sampling – Monte Carlo Sampling technique – one sample t test – Test of significance - Confidence Interval Estimation – Interpretation of Confidence Interval – Bayesian Statistics

UNIT IV	**HYPOTHESIS TESTING**	**9+3**

What is a Hypothesis – Terminology in Hypothesis Testing - Formation of Hypothesis – Test Procedures – Errors in Hypothesis testing – Neyman-Pearson Lemma – Hypothesis testing using a single sample – Hypothesis tests for a population mean – P value – Hypothesis testing using t test – One tailed and two tailed hypothesis test – Paired and Unpaired test – Test of Variance – Chi square test for univariate data – Test for Homogeneity and independence – Introduction to Analysis of Variance – One way Analysis of Variance – Kruskal Wallis Rank Sum Test – Two way ANOVA – ANOVA vs T Test – MANOVA – ANOVA Vs MANOVA

UNIT V	Probability	**9+3**

Fundamentals of Probability – Axioms of Probability – Consequences of Axioms – Distribution Function – Prior and Posterior Distribution - Properties of Distributi Function - Joint Probability – Conditional Probability – independence – Bayes Theorem – Sampling using Gibbs sampling – Bayesian Networks – Stochastic Process – Simple Random Walk – Markov Chains – What is Markov chain – Applications of Markov chains – Computing Markov Chains – Markov Chain Monte Carlo sampling – Path forward

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**15**	**0**	**0**	**60**

TEXT BOOKS

Applied Statistics And Probability For Engineers – By Douglas Montgomery

REFERENCES
1. Introduction to Data Mining, Tan, Steinbach and Vipin Kumar, Pearson Education, 2016 2. Wasserman, L. (2004). All of Statistics: A concise course in statistical inference
E-REFERENCES
1. Casella,G.andBerger,R.L.(2002).StatisticalInference,2nded

Table 1: Mapping of Cos with POs.

B.Sc AI	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	2	2	1			2	1
CO2	1	2	2	2	1			2	
CO3	1		2	1	2				
CO4	2	1	2	3	1			2	1
CO5	2		1	3				2	
Total	8	5	9	11	5			8	2
Scaled Value	2	1	2	3	1			2	1

1 -- 5 □ 1, 6-- 10 □ 2, 11--15 □ 3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

Course Code	**XAI 106**	**L**	**T**	**P**	**C**
Course Name	**PROGRAMMING METHODOLOGIE LAB**	**0**	**0**	**1**	**2**
C:P:A	**0:1.5:0.5**	**L**	**T**	**P**	**H**
		0	**0**	**3**	**3**

1. Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following:
   - **a.** To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.
2. Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following :
3. Learn how to use functions and parameter passing in functions, writing recursive programs.
4. **Write Programs to learn the use of strings and string handling operations**.
5. . Problems which can effectively demonstrate use of Arrays. Structures and Union.
6. Write programs using pointers
7. .Write programs to use files for data input and output.
8. .Write programs to implement search algorithms.

B.Sc AI	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	1	1	1	2	1			2	1
CO2	1	2	2	2	1			2	
CO3	1		1	1	2				
CO4	2	1	2	3	1			2	1
CO5	2		1	3				2	
Total	8	5	9	11	5			8	2
Scaled Value	2	1	2	3	1			2	1

1 -- 5 □ 1, 6-- 10 □ 2, 11--15 □ 3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

Course Code	XAI 107	L	T	P	C
Course Name	Principles of Statistics Lab	0	0	1	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	2	2

1. Fundamentals of Knime
2. Web scraping in Knime
3. Exploratory Data analysis in Knime
4.Nuances of JASP
5. Building statistical models in JASP
6. Descriptive Statistics in JASP
7. Data Visualization in Knime
8. Building a Linear Regression Model
9. Identifying correlation between data in knime
10. Implementation of Student t test
11. Confidence Interval estimation
12.Sampling in Knime
13. Hypothesis Test using student t test
14. Implementation of Paired Hypothesis test
15. Contingency Tables in JASP
16. Implementation of Chi square test for Independence
17. Implementation of Analysis of Variance in JASP
18. Implementation of MANOVA in JASP
19. Implementation of Bayesian Model in Knime
20. Bayesian Parameter estimation in JASP

COURSE CODE	XUMA001	L	T	P	SS	C
COURSE NAME	HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY	2	0	0	1	0
PREREQUISITES	-	L	T	P	SS	H
C:P:A	1.5:0:0.5	2	0	0	1	3

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

UNIT I HUMAN ETHICS AND VALUES	**6+3**
Human Ethics and values - 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.	
UNIT IIGENDER EQUALITY	**6+3**
Gender Equality - Gender Vs Sex, Concepts, definition, Gender equity, equality, and empowerment. Status of Women in India Social, Economic, Education, Health, Employment, HDI, GDI, GEM. Contributions of Dr.B.R. Ambetkar, ThanthaiPeriyar and Phule to Women Empowerment.	
UNIT IIIWOMEN ISSUES AND CHALLENGES	**6+3**
Women Issues and Challenges- 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, and Rights to Education, Medical Termination of Pregnancy Act, and Dowry Prohibition Act.	
UNIT IV HUMAN RIGHTS	**6+3**
Human Rights Movement in India – The preamble to the Constitution of India, Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economic, Social and Cultural Rights, Rights against torture, Discrimination and forced Labor, Rights and protection of children and elderly. National Human Rights Commission and other statutory Commissions, Creation of Human Rights Literacy and Awareness. - Intellectual Property Rights (IPR). National Policy on o**ccupational safety, occupational health and working environment.**	
UNIT V GOOD GOVERNANCE AND ADDRESSING SOCIAL ISSUES	**6+3**
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	**TUTORIAL**	**SELF STUDY**	**PRACTICAL**	**TOTAL**
30	**0**	**15**	**0**	**45**

Textbook

1. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
2. Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights, 1998).
3. Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).
4. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
5. Veeramani, K. (ed) Periyar Feminism, (PeriyarManiammai University, Vallam, Thanjavur: 2010).

Reference Books

1. Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).
2. Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).
3. Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).
4. Kaushal, Rachna, Women and Human Rights in India (New Delhi: Kaveri Books, 2000)

E-Reference

1. http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p
2. http://cvc.nic.in/welcome.html.
3. https://www.transparency.org/
4. https://www.hrw.org/world-report/2015/country-chapters/india

XGE202			**ENGLISH II**	**L**	**T**	**P**	**SS**	**C**
				2	**1**	**0**	**0**	**3**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
1.5	**0**	**0.5**		**2**	**1**	**0**	**0**	**4**

PREREQUISITE: Nil

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
On the successful completion of this course students would be able to			
CO1	***Recall*** the basic grammar and using it in proper context	Cognitive	Remembering
CO2	***Explain*** the process of listening and speaking	Cognitive	Understanding
CO3	***Adapt*** important methods of reading	Cognitive	Creating
CO4	***Demonstrate*** the basic writing skills	Cognitive	Understanding

UNIT I	**Advanced Reading**	**6**
i. Reading texts of different genres and of varying length ii. Different strategies of comprehension iii. Reading and interpreting non-linguistic texts iv. Reading and understanding incomplete texts (Cloze of varying lengths and gaps; distorted texts.)		
UNIT II	**Advanced Writing**	**6**
v. Analysing a topic for an essay or a report vi. Editing the drafts arrived at and preparing the final draft vii. Re-draft a piece of text with a different perspective (Manipulation exercise) viii. Summarise a piece of prose or poetry ix. Using phrases, idioms and punctuation appropriately		
UNIT III	**Principles of communication and communicative competence**	**6**
x. Introduction to communication – principles and process xi. Types of communication – verbal and non-verbal xii. Identifying and overcoming problems of communication xiii. Communicative competence		
UNIT IV	**Cross Cultural Communication**	**6**
xiv. Cross-cultural communication		

LECTURE	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
30	**0**	**30**	**0**	**60**

REFERENCES:

1) Bailey, Stephen (2003). Academic Writing. London and New York, Routledge.

2) Department of English, Delhi University (2006). Fluency in English Part II. New Delhi, OUP

3) Grellet, F (1981). Developing Reading Skills: A Practical Guide to Reading Skills. New York, CUP

4) Hedge, T. (2005). Writing. London, OUP

5) Kumar, S and Pushp Lata (2015). Communication Skills. New Delhi, OUP

6) Lazar, G. (2010). Literature and Language Teaching. Cambridge, CUP

7) Nuttall, C (1996). Teaching Reading Skills in a Foreign Language. London, Macmillan

8) Raman, Meenakshi and Sangeeta Sharma (2011). Technical Communication: Principles and Practice. New Delhi, OUP

XAI 203- DATA STRUCTURES

XAI 203			DATA STRUCTURES	L	T	SS	C
				3	1		4
C	P	A		L	T	SS	H
3	1	0		3	1		4

PREREQUISITE: Computer Programming

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Explains*** the concept of data structures and with the	Cognitive	Understand

	manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles	Psychomotor	Apply
CO2	***Choose*** To have a knowledge of complexity of basic operations like insert, delete, search on these data structures	Cognitive	Remember
CO3	Ability to choose a data structure to suitably model any data used in computer applications	Cognitive Psychomotor	Apply Set
CO4	Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.	Cognitive	Analyze
CO5	Ability to assess efficiency tradeoffs among different data structure implementations. Implement and know the applications of algorithms for sorting, pattern matching etc.	Cognitive	Create

UNIT I	**INTRODUCTION**	**9+3**

Basic concepts- Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction Performance analysis, Linear and Non-Linear data structures, Singly Linked Lists-Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations. Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

UNIT II	**LINEAR DATA STRUCTURES**	**9+3**

Stack- Operations, Array and Linked Implementations, Applications- Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation, Queue- Definition and Operations, Array and Linked Implementations, Circular Queues - Insertion and Deletion Operations, Dequeue (Double Ended Queue).

UNIT III	**TREES**	**9+3**

Trees, Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees, Priority Queue- Implementation, Heap- Definition, Insertion, Deletion.

UNIT IV	**GRAPHS**	**9+3**

Graphs, Graph ADT, Graph Representations, Graph Traversals, Searching, Static
Hashing- Introduction, Hash tables, Hash functions, Overflow Handling. Sorting Methods, Comparison of Sorting Methods.

UNIT V	**ALGORITHM DESIGN TECHNIQUES**	**9+3**

Search Trees- Binary Search Trees, AVL Trees- Definition and Examples.Red-Black and Splay Trees, Comparison of Search Trees, Pattern Matching,Algorithm- The Knuth-Morris-Pratt Algorithm, Tries (examples).

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	**15**	**45**		**60+45**

REFERENCES:

1. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson
3. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
    1. www.tutorialspoint.com
    2. www.nptel.com
    3. www.virtuallab.ac.in

4. Lecture Slides, Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
5. Lecture Slides : http://www.mhhe.com/engcs/compsci/forouzan/

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

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

COURSE CODE	**XBC204**	**L**	**T**	**P**	**SS**	**C**
COURSE NAME	**DISCRETE MATHEMATICS**	3	1	0	2	6
PREREQUISTE	**NIL**	**L**	**T**	**P**	**SS**	**H**
C:P:A	**3:0:0**	3	1	0	2	**6**

Course Outcome		**Domain**	**Level**
CO1	***Define*** the properties and laws of sets, relations and functions and***Apply*** the operation of the sets using venDiagram.	**Cognitive**	R, Ap
CO2	***Apply***the concepts of logic and to find the normal forms. ***Explain*** the tautologies and Contradiction.	**Cognitive**	U, Ap
CO3	***Apply*** the counting principle permutation and combination and to ***solve*** the problem. ***Explain*** the pigeonhole principle.	**Cognitive**	U, Ap
CO4	***Explain*** the types of lattices and to***show*** lattices as partially ordered sets.	**Cognitive**	U, Ap
CO5	***Apply*** **the** properties of semi groups and groups and Explain any set with binary operation as a semigroup and group with examples.	**Cognitive**	U, Ap

UNIT I	**12**
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	**12**
Statements - Normal forms – CNF – DNF – PCNF - PDN – Tautologies - Contradictions.	
UNIT III	**12**
Counting principles – The Pigeonhole principle – Counting – Permutations and Combinations –	

Combinatorial arguments – Countable and uncountable sets.				
UNIT IV				**12**
Lattices as partially ordered set – Types of lattices – Lattices as algebraic system.				
UNIT V				**12**
Binary operations – Semi groups - Groups – Examples and elementary properties.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**15**	**0**	**30**	**60 + 30**

TEXT BOOK

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. Dr.M.K.Venkataraman, Dr.N.SridharanN.Chandrasekaran, "Discrete Mathematics", the National Publishing Company, 2003.
3. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics", 10th edition,Tata McGraw Hill Companies,2010.

E REFERENCES

1. www.nptel.ac.in
2. Graph Theory A NPTEL Course S.A. Choudum.
3. Graph Theory by Prof. L. Sunil Chandran Computer Science and Automation Indian Institute of Science, Bangalore.

Mapping of CO's with PO's:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**3**	**1**				**1**	
CO2	**3**	**1**	**1**			**1**	
CO3	**3**		**1**			**1**	
CO4	**3**					**1**	**1**
CO5	**3**					**1**	**1**

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XAI205- PYTHON PROGRAMMING

XAI205			**PythonProgramming**	**L**	**T**	**P**	**SS**	**C**
				3	**0**	**1**		**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**1**	**0**		**3**	**0**	**3**		**6**

PREREQUISITE: Computer Programming

Course Outcomes	**Domain**	**Level**
After the completion of the course, students will be able to		

CO1	Understand Nuances and paradigms of Programming	Cognitive	Knowledge Comprehension
CO2	Understand Object Oriented Programming methods	Cognitive	Knowledge Comprehension
CO3	***Build*** *Graphical User Interface using Tkinter*	Cognitive Psychomotor	Application Synthesis
CO4	***Build*** **and***Deploy*web appsusingFlask	Cognitive Psychomotor	Application Synthesis
CO5	***Develop***2-dimensionalGamesusingPygame	Cognitive Psychomotor	Application Synthesis

UNIT I	**FundamentalsofPython**	**3**

Introduction to Programming - What is Computing? - Various Programming Paradigms -What is a Programming Language? - Compilers Vs Interpreters - Introduction to PythonProgramming - Why Python Programming language - Applications of Python Programminglanguage - Essential Tools for Python Developer - Installation of Anaconda Environment -HandlingofJupyterNotebooks-FundamentalsofPythonProgramming–Variables&Assignments-Multipleassignmentconcept-PrintingStringsinPython-Executingsequenceof statements - User Input - Representing Data In Python – I - Numerical Types - HandlingArraysInpython-ArrayManipulation-ListsinPython-ListManipulation-StringsinPythonRepresenting Datain Python–II–Tuples-Sets& Frozensets–Dictionarie

UNITII	**ControlStructureandFunctionalprogramming**	**3**

ControlFlowinPython-ConditionalStatements-Ifstatements-RulesofIndentation

- Ifelsestatement-ElifStatement-NestedIfstatement-RuleBasedExpertSystems-Control Flow in Python – Loops - When to use loops - For loop - While loop - Breakand continue statement - Functions and Functional Programming-I - UnderstandFunction execution - Create simple functions in Python - Functional Programmingtools-FunctionsandFunctionalProgramming-II-Lambdafunctions-Mapandfilters
- Iterators, generators - Modules and Packages - Working with existing Packages inPython

UNITIII	**ObjectOrientedProgramming**	**3**

ObjectOrientedApproach-TerminologyinObjectOrientedProgramming-Introduction to Classes and Objects - Working with Custom classes - Parent Class VsChildClass-AttributesandMethods–Encapsulation-InheritanceandPolymorphism

- Controlling Attribute access– Functors - Class Descriptors- Multiple Inheritance-Metaclasses–AlgorithmsinPython-WhatisanAlgorithm?-AlgorithmVsProblems
- How to write an Algorithm - - Introduction to Search algorithms - Fundamentals ofGraph theory-RepresentingProblemsasagraph- Graphtraversal

UNITIV	**PythonApplications–GraphicalUserInterface**	**3**

Introduction to Graphical User Interface – I - What is a Graphical User Interface?-IntroductiontoTkinter-FundamentaloperationsinTkinter-Creatingsimpleinterfaces in python using Tkinter – Build GUI using Tkinter - Building a Dialog styleprogram - Building a Main window style interface - Advanced Functions in Tkinter -Create a student data management system - Developing a Forward Kinematic ModelGUIinpython

UNITV	GameAndWebDevelopmentinPython	3
GameDevelopmentinPython-IntroductiontoGamedevelopment-GamedevelopmentPipeline-Gameframeworksandlibrariesinpython-Fundamentalsof Pygame– BuildingGameswithPygame - Event types,Informationandqueue - Pygame modules - Web services in Python - Introduction to web development -Variouspythonframeworksforwebdevelopment-RESTfulAPIservicespIntroductiontoFlask-ImplementingaFlaskWebservice–BuildingaFlaskApplication-HandlingJSONfiles-EncodinginformationinJSON-Setting upservices-Buildapersonalprofileinflask		

LECTURE	TUTORIAL	PRACTICAL	Totalhours
15	0		60

TEXTBOOKS:

Campbell,Gries,Montojo,andWilson,PracticalProgramming:AnIntroductionto ComputerScienceUsingPython.ThePragmaticBookshelf,2009

REFERENCES:

MarkNewmann:ComputationalPhysicswithPython,2ndEd.(2012)
J.M.Stewart:PythonforScientists,CambridgeUniv.Press(2014)

E-REFERENCES:

Guttag,John.IntroductiontoComputationandProgrammingUsingPython:With ApplicationtoUnderstandingDataSecondEdition.MITPress,2016.ISBN:9780262529624

Mapping of CO's with PO's:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1		1	2	1	
CO2	3	1	1	1		1	
CO3	3		1		2	1	
CO4	3			1		1	1
CO5	3	1	1		2	1	1
	15	3	3	3	6	5	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XAI 206- DATA STRUCTURES LAB

XAI 206			DATA STRUCTURES LAB	L	T	P	SS	C
						3		3
C	P	A		L	T	P	SS	H
0	1	0				3	Z	3

PREREQUISITE: Computer Programming

Course Outcomes	Domain	Level

UNIT I	INTRODUCTION	9+3+ 9

Lab

Write program that uses functions to perform the following:

1) Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.
2) Implement the operations, insertion, deletion at a given position in the list and search for an element in the list
3) To display the elements in forward / reverse order
4) Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion)
5) Write a program to implement queue data structure and basic operations on it (Insertion, deletion, find length) and code at least one application using queues
6) Write a program that uses well defined functions to Create a binary tree of elements and Traverse a Binary tree in preorder, inorder and postorder.
7) Write program that implements linear and binary search methods of searching for an element in a list.
8) Write and trace programs to understand the various phases of sorting elementsusing the methods.
   a) Insertion Sort b) Quicksort c) Bubble sort
9) Write and trace programs to Create a Binary search tree and insert and delete from the tree.
10) Represent suitably a graph data structure and demonstrate operations of traversals on it.

XAI207- PYTHON PROGRAMMING LAB

Course Code	XAI207	L	T	P	C
Course Name	PYTHON PROGRAMMING LAB	0	0	4	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	4	4
					60

1.Handling Jupyter notebooks
2.Data types in Python – I
3.Data Types in Python - II
4.Executing Conditional Statements in Python
5.Executing For loop and its variants in Python
6.Executing While loop in python
7.Building an Expert System in Python
8.Functional Programming in Python
9.Creating Modules in Python
10.Handling XML files in Python
11.Modelling an Expert system with Classes
12.Implementation of Binary Search in Python
13.Implementation of Bubble sort in python
14.Implementation of Breadth First Search
15.Implementation of Depth First Search in Python
16.Working with Bellman-Ford Algorithm in Python
17.Fundamentals of Tkinter
18.Building a simple Calculator using Tkinter
19.Building a student information system using Tkinter

20.Fundamentals of Pygame
21.Build a simple snake game in python
22.Creating a star ship meteors game in Pygame
23.Fundamentals of Flask
24.Build a student Digital Profile using FLASK

XUMA002			ENVIRONMENTAL STUDIES	L	T	P	SS	C
				0	0	0	0	0
C	P	A		L	T	P	SS	H
1.5	0	0.5		2	0	0	1	3

PREREQUISITE : Nil

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Remember Understand
CO2	***Illustrate*** the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.	Cognitive	Understand
CO3	***Identify*** the facts, consequences, preventive measures of major pollutions and ***recognize*** the disaster phenomenon	Cognitive Affective	Remember Receiving
CO4	***Explain*** the socio-economic, policy dynamics and***practice*** the control measures of global issues for sustainable development.	Cognitive	Understand
CO5	the impact of population and the concept of various welfare programs, and ***apply*** themodern technology towards environmental protection.	Cognitive	Understand Apply

UNIT I	**INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY**	**6**

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.

UNIT II	**ECOSYSTEMS AND BIODIVERSITY**	**6**

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.

UNIT III	**ENVIRONMENTAL POLLUTION**	**6**

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.

UNIT IV	**SOCIAL ISSUES AND THE ENVIRONMENT**	**6**

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.

UNIT V	**HUMAN POPULATION AND THE ENVIRONMENT**	**6**

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.

Lecture	**Tutorial**	**Self-Study**	**Practical**	**Total**
30	**0**	**15**	**0**	**45**

Text book

1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.
2. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, 2003

Reference Books

1. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.
2. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.
3. Introduction to International disaster management, Butterworth Heinemann, 2006.
4. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.
5. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, 2009.
6. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
7. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.

8. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, 2003.
9. Sundar, Disaster Management, Sarup& Sons, New Delhi, 2007.
10. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.

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

M.Sc (Computer Science)

COURSE CODE			**YCS101**	**L**	**T**	**P**	**C**
COURSE NAME			**ADVANCED OPERATING SYSTEMS**	**4**	**1**	**0**	**5**
C	**P**	**A**		**L**	**T**	**P**	**H**
3	**0.5**	**0.5**		**4**	**1**	**0**	**5**
PREREQUISITE			Operating Systems				

COURSE OUTCOMES:

Course outcomes:		**Domain**	**Level**
CO1	**Generalize** the functions, types, advanced concepts in operating system, and the process concepts.	Cognitive	Understand
CO2	**Analyze** deadlock situations, the reason for deadlock, recovery of deadlocks and how to avoid deadlocks.	Cognitive Psychomotor	Analyze Set
CO3	**Illustrate** and **analyze** the concepts of distributed operating systems, issues and file system coding in distributed system.	Cognitive	Analyze
CO4	**Distinguish** the need of Real time operating system and describe about security issues and applications of real time operating system.	Cognitive Affective	Understand Organization
CO5	**Explain** the information about the Linux operating system and iOS architecture, layers and their functions	Cognitive Psychomotor	Understand Orgination

Unit I PROCESS SYNCHRONIZATION : **12 Hours**

Overview - Introduction – Functions of an operatingsystem – Design approaches – Why advance operating systems – Types of advancedoperating systems. Synchronization mechanisms: Introduction – Concept of a process –Concurrent processes – The critical section problem – Other synchronization problems.Process deadlocks: Introduction – preliminaries – models of deadlocks

Unit II DISTRIBUTED OPERATING SYSTEMS **12 Hours**

Issues – Communication Primitives – Lamport'sLogical Clocks – Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems –design issues – Case studies – The Sun Network File System-Coda.

Unit III REAL TIME OPERATING SYSTEMS **12 Hours**

Introduction – Applications of Real Time Systems– Basic Model of Real Time System – Characteristics – Safety and Reliability - Real TimeTask Scheduling

Unit IV OPERATING SYSTEMS FOR HANDHELD SYSTEMS	12 Hours
Requirements – TechnologyOverview – Handheld Operating Systems – Palm OS - Android – Architecture of android –Securing handheld systems	
Unit - V LINUX AND IOS LINUX SYSTEM	**12 Hours**
Introduction – Memory Management – ProcessScheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS: Architectureand SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.	

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. MukeshSinghal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems – Distributed Database, and Multiprocessor Operating Systems", Tata McGraw-Hill Publishers,2011
2. Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education IndiaPublishers, Second Edition, 2008.
3. Daniel.P.Bovet& Marco Cesati, "Understanding the Linux kernel", O"ReillyPublishers ,3rd edition, 2005

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1. Neil Smyth, "iPhone iOS 4 Development Essentials – Xcode", Payload media Publishers, Fourth Edition 2011
2. YoonSeokPyo, HanCheol Cho, RyuWoon Jung, TaeHoon Lim, "ROS Robot ProgrammingFrom the basic concept to practical programming and robot application", ROBOTICS Co.,Ltd, 2017.
3. Pramod Chandra P.Bhatt, "An Introduction To Operating Systems, Concept And Practice", PHI publishers, Third edition, 2013.
4. Andrew S. Tanenbaum, "Modern Operating System", Prentice-Hall, Inc, Third edition, 2008
5. AnisKoubaa, "Robot Operating System (ROS) The Complete Reference (Volume 1)", Springer Publishers, First Edition,2016

E-REFERENCES

1. https://onlinecourses.nptel.ac.in/noc21_cs44

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS102	L	T	P	C
COURSE NAME			INTERNET OF THINGS	3	1	0	4
C	P	A		L	T	P	H
2.5	0.3	0.2		3	1	0	4
PREREQUISITE			Sensors, Wireless Communication				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Define** the basics of IoT and its characteristics	Cognitive	Remember
CO2	**Generalize** the building blocks of IoT from physical and logical context	Cognitive Psychomotor	Understand Perception
CO3	**Apply** the functionality of various architectures and protocols of IoT	Cognitive Affective	Apply Receive
CO4	**Illustrate** the importance of Web of Things and Cloud of Things	Cognitive PsychomotorAffective	Apply Mechanism Respond
CO5	**Analyze** the applications of IoT in various domains and analyze the real-world design constraints	Cognitive	Analyze

Unit I INTRODUCTION TO INTERNET OF THINGS — **12 Hours**

Introduction to IoT- Elements of an IoT- Technology drivers- Business drivers- Typical IoT applications- Trends and implications- Physical design of IoT- Logical design of IoT-IoT levels and deployment templates.- IoT in Home automation, smart cities, Energy, agriculture, retail, logistics, environment, health &life style and industry

Unit II TECHNOLOGIES FOR IoT — **12 Hours**

IoT enabling technologies-M2M, – IEEE 802.15.4, WSN- sensors, actuators, WSN protocols, RFID, NFC,Zigbee, GSM, GPRS, Bluetooth- Cloud computing, Big Data analytics, Communication protocols, Embedded systems.

Unit III IoT PROTOCOLS — **12 Hours**

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

Unit IV DESIGN AND DEVELOPMENT — **12 Hours**

Design Methodology - Embedded computing logic – Microcontroller-Arduino - Board detailsNode MCU- ESP8266- Pin configuration- interfacing. Introduction to python- python package for IoT.

Unit V IoT APPLICATIONS — **12 Hours**

Home Automation -Smart Lighting -Smart Appliances - Intrusion Detection - Smoke/Gas Detectors - Smart cities. Case Studies: e.g. sensor body-area-network.

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. ArshdeepBahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2017
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, ―IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

REFERENCES

1. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols, Wiley, 2012

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1. https://nptel.ac.in/courses/106105166/
2. https://nptel.ac.in/courses/108108098/
3. https://www.arduino.cc/.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS103	L	T	P	C
COURSE NAME			ADVANCED COMPUTER ARCHITECTURE	3	1	0	4
C	P	A		L	T	P	H
2.5	0.3	0.2		3	1	0	4
PREREQUISITE			Computer Architecture				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Define**the various models of parallel computer and tell the state of computing	Cognitive Psychomotor	Remember Perception
CO2	**Understand** the working principles of system interconnect architectures and know about Paralleling	Cognitive Psychomotor	Understand Set
CO3	**Analyse**processor Technologiesandunderstand the hierarchy of memory.	Cognitive Psychomotor	Analyze Perception
CO4	**Devise** theMultiprocessor System interconnects and know its connection mechanism	Cognitive Affective	Evaluate Organization
CO5	**Design** and **illustrate** Models and Arrays	Cognitive	Create

Unit I PARALLEL COMPUTER MODELS **12 Hours**

The state of computing - Multiprocessors and multicomputers – Multivector and SIMD computers.

Unit II PROGRAM AND NETWORK PROPERTIES	12 Hours
Conditions of parallelism – Program partitioning and scheduling – program flow mechanisms – system interconnect architectures.	
Unit III PROCESSORS AND MEMORY HIERARCHY	**12 Hours**
Advanced processor Technology – Super scalar and vector processors – Linear Pipeline Processors – Nonlinear pipeline Processors.	
Unit IV MULTIPROCESSORS AND MULTICOMPUTER	**12 Hours**
Multiprocessor System interconnects – Message Passing Mechanisms – SIMD Computer Organizations – The Connection Machine CM 5 – Fine-Grain Multicomputers.	
Unit V SOFTWARE FOR PARALLEL PROGRAMMING	**12 Hours**
- Parallel Programming Models – Parallel Languages and Compilers – Dependence Analysis of Data Arrays.	

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. Kai Hwang, "Advanced Computer Architecture "McGraw-Hill International Edn., Singapore , 1993.

REFERENCES

1. Kai Hwang and Faye A.Briggs, "Computer Architecture and Parallel Processing", McGraw- Hill International Editions, Singapore , 1985.
2. Michael J.Quinn, "Parallel Computing, Theory and Practice", McGraw-Hill International Edn., Singapore , 1994.

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1. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs62

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS104	L	T	P	C
COURSE NAME			ADVANCED DATABASE MANAGEMENT SYSTEMS	3	1	1	5
C	P	A		L	T	P	H
3	0.7	0.3		3	1	2	6
PREREQUISITE			Database Management System				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Describe**purpose of database in relational models and designing of schema	Cognitive Psychomotor	RememberPerception
CO2	**Illustrate** functioning of various SQLqueries and special functions	Cognitive Psychomotor	AnalysePerception
CO3	**Analyse**various security issues and find the apt recoverability method	Cognitive Psychomotor Affective	AnalysePerceptionReceive
CO4	**Understand** and**Explain**the characteristics of distributed database	Cognitive Psychomotor Affective	Understand Set Respond
CO5	**Identify** and **Explain** Need for Data Analysisin Business intelligence	Cognitive	Create

Unit I INTRODUCTION	**12 Hours**
Purpose of Database Systems -View of Data -Database Languages -Data Storage and Querying-Transaction Management –Storage Management –Data Mining and Information Retrieval -Speciality Databases - Database Users and Administrators–Relational Databases: Introduction to the Relational Model -Structure of Relational Databases-Database Schema -Keys-Schema Diagrams - Relational Query Languages - Relational Operations Lab Exercise: Creating table with and without constraints, Inserting/Deleting/updating records in a table, saving(Commit) and Undoing(rollback).	
Unit II ADVANCED SQL	**12 Hours**
Constraints- SQL CREATE INDEX- SQL functions-The GROUP BY statementThe HAVING clause- SQL special functions- SQL alias- SQL join – Sub queries- Recursive queries-Data control language-Views and assertion- PL/SQL- a basic introduction-Triggers- Event condition action model-Functions and procedures-Embedded SQL and dynamic SQL- The java way to access RDBMS: JDBC- SQLJ Lab Exercise: Altering a table, dropping/truncating, renaming, Backing up/restoring a database	
Unit III TRANSACTION PROCESSING AND SECURITY:	**12 Hours**
Defining a transaction in DBMS-Defining a concurrent transaction in DBMS- Serializability and Recoverability- Enhanced lock-based and timestamp based concepts-Multiple granularity-Multi version schemes-optimistic concurrency control techniques-Deadlock handling-Recovery in DBMS-write Ahead logging protocol-Advanced recovery techniques-Use of SQL in recovery -RAID. Data security: Data security issues Discretionary access control- Mandatory access control- Role based access control- SQL injection Statistical databases- Introduction to flow control Lab Exercise:For a set of relation schemas, creating a table and perform simple queries with aggregate functions, data function, math functions	
Unit IV DISTRIBUTED DBMS	**12 Hours**
The Evolution of Distributed Database Management Systems -DDBMS Advantages and Disadvantages - Distributed Processing and Databases - Characteristics of Distributed DBMS -DDBMS Components - Levels of Data and Process Distribution -Distribution Transparency -Transaction Transparency-Distributed Database Design - Client/Server vs. DDBMS. Lab ExerciseEmbed PI/SQL in a high level host language such as C/Java	
Unit V BUSINESS INTELLIGENCE AND DATA WAREHOUSE	**12 Hours**

The Need for Data Analysis -Business Intelligence and Architecture -Data Warehouse-OLAP -Star Schemas -Implementing a Data Warehouse -SQL Extensions for OLAP. Database Connectivity - Internet Databases. Security and authorization: Access control- Discretionary access control-Mandatory access control – security for internet applications-Issues related to security-case study Lab Exercise: Creating connection with database

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. RiniChakrabarti, ShilbadraDasgupta, Subhash K. Shinde," Advanced Database Management System", KLSI, Dreamtech press, 2014.
2. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition 2004.

REFERENCES

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.

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1. https://nptel.ac.in/courses/106/105/106105175/
2. https://onlinecourses.nptel.ac.in/noc21_cs04

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS105	L	T	P	C
COURSE NAME			WEB TECHNOLOGIES	3	1	1	5
C	P	A		L	T	P	H
3	0.5	0.5		3	1	2	6
PREREQUISITE			Python Programming				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Define** the technologies used in Web design and development	Cognitive Psychomotor	Remember Set
CO2	**Discuss** various techniques Python for Web technologies	Cognitive Psychomotor	Understand Guided Response

CO3	**Explain** and **apply** Django for Web technologies	Cognitive Psychomotor	Apply Mechanism
CO4	**Illustrate** Flutter and to **examine** application	Cognitive Affective	Apply Receive
CO5	**Design** and **Develop** an application with data base using Sqlite	Cognitive Affective	Create Response

Unit I Web Technologies — **12 Hours**

Introduction to Web Technologies – The Internet - WWW- Frontend Vs Backend Development Technologies - Programming Languages And Frameworks - Data bases – Future of web technology - Python for web development - A roadmap for web development with Python

Lab Exercises :

Creating a web site , Creating a home page

Unit II Python — **12 Hours**

Introduction to Python – variables –data types –numbers – casting –string -boolean – operators – array – control structures – Input output – functions

Lab Exercises :

Working with forms, Generic List and detail view

Unit III Django — **12 Hours**

Django Introduction – Installation – Project - Apache configuration – virtual environment set up – admin Interface – Django app – Django module – Django view –Django template – Django forms – Django sessions –cookies

Lab Exercises :

Working with sessions, cookies

Unit IV Flutter — **12 Hours**

Introduction – Installation – Architecture of flutter framework - Introduction to Dart programming – widget – Layout –Gesture - state management – animation – data base concepts

Lab Exercises

Working with Mobile / Web App

Unit V SQlite — **12 Hours**

Introduction – Installation – commands – data type –create –attach- detach – insert – drop – update – delete – order by – group by – having – Sqlite –Python

Lab exercises:

Working with database connectivity

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. "Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI", Ivan Bayross, BPB Publication.
2. Python Programming a Modular Approach with Graphics, Database, Mobile, and Web Applications – SheetalTaneja, Naveen Kumar – Pearson Publication, 2018

REFERENCES

1. ReemaThareja"Python Programming ", Oxford University Press, 2017
2. Lambert – Cengage "Fundamentals of Python Programming", Publications, 2017
3. E. Balagurusamy "Problem Solving using Python ", McGraw Hill Education Ltd.

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1. https://www.goodcore.co.uk/blog/web-technologies/
2. https://www.educative.io/blog/web-development-in-python#suited
3. https://www.w3schools.com/PYTHON/,

4. geeksforgeeks.org/python-programming-language
5. https://www.javatpoint.com/django-tutorial
6. https://www.tutorialspoint.com/flutter/
7. https://www.tutorialspoint.com/sqlite/index.htm

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS201	L	T	P	C
COURSE NAME			VIRTUAL AND AUGMENTED REALITY	4	1	0	5
C	P	A		L	T	P	H
3	0.5	0.5		4	1	0	5
PREREQUISITE			Nil				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	To **recall**theoverview of virtual reality and its environment	Cognitive	Remember
CO2	To **understand** user Interface and characteristics ofnecessary Input devices	Cognitive Psychomotor	Understand Set
CO3	To **illustrate**virtual reality environment and virtual reality database	Cognitive Affective	Apply Receive
CO4	To **discuss** 3D interaction Techniques and the 3D Manipulation Tasks	Cognitive Psychomotor	Analyze Origination
CO5	To **design** and **construct** visualization techniques	Cognitive Affective	Create Respond

Unit I Virtual Reality And Virtual Environments — **12 Hours**

The historical development of VR: Scientific landmarks Computer Graphics, Real-time computer graphics, Flight simulation, Virtual environments, Requirements for VR, benefits of Virtual reality. Hardware technologies for 3d user interfaces: Visual Displays Auditory Displays, Haptic Displays, Choosing Output Devices for 3D User Interfaces.

Unit II 3D User Interface Input Hardware — **12 Hours**

Input device characteristics, Desktop input devices, Tracking Devices, 3D Mice, Special Purpose Input Devices, Direct Human Input, Home - Brewed Input Devices, Choosing Input Devices for 3D Interfaces.

Unit III Software Technologies — **12 Hours**

Database - World Space, World Coordinate, World Environment, Objects - Geometry, Position / Orientation, Hierarchy, Bounding Volume, Scripts and other attributes, VR Environment - VR Database, Tessellated Data, LODs, Cullers and Occluders, Lights and Cameras, Scripts, Interaction - Simple, Feedback, Graphical User Interface, Control Panel, 2D Controls, Hardware Controls, Room / Stage / Area

Descriptions, World Authoring and Playback, VR toolkits, Available software in the market

Unit IV 3D Interaction Techniques	**12 Hours**

3D Manipulation Tasks, Manipulation Techniques And Input Devices, Interaction Techniques For 3D Manipulation, Deign Guidelines - 3D Travel Tasks, Travel Techniques, Design Guidelines - Theoretical Foundations Of Wayfinding, User CenteredWayfinding Support, Environment CenteredWayfinding Support, Evaluating Wayfinding Aids, Design Guidelines - System Control, Classification, Graphical Menus, Voice Commands, Gestrual Commands, Tools, Mutimodal System Control Techniques, Design Guidelines, Case Study: Mixing System Control Methods, Symbolic Input Tasks, Symbolic Input Techniques, Design Guidelines, Beyond Text And Number Entry .
DESIGNING AND DEVELOPING 3D USER INTERFACES: Strategies ForDesigning And Developing Guidelines AndEvaluation
VIRTUAL REALITY APPLICATIONS: Engineering, Architecture, Education, Medicine, Entertainment, Science, Training

Unit V Augmented Reality	**12 Hours**

Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

HOURS	**LECTURE**	**TUTORIAL**	**TOTAL**
	45	**15**	**60**

TEXT BOOKS

1. Alan B Craig, William R Sherman and Jeffrey D Will, “Developing Virtual Reality Applications: Foundations ofEffective Design”, Morgan Kaufmann, 2017.
2. Gerard Jounghyun Kim, “Designing Virtual Systems: The Structured Approach”, 2015.
3. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, “3D User Interfaces, Theory and Practice”,Addison Wesley, USA, 2015.
4. Oliver Bimber and Ramesh Raskar, “Spatial Augmented Reality: Meging Real and Virtual Worlds”, 2015.
5. Burdea, Grigore C and Philippe Coiffet, “Virtual Reality Technology”, Wiley Interscience, India, 2013.

REFERENCES

1. John Vince, “Virtual Reality Systems”, Addison Wesley, 1995.
2. Howard Rheingold, “Virtual Reality: The Revolutionary Technology and how it Promises to Transform Society”,Simon and Schuster, 1991.
3. William R Sherman and Alan B Craig, “Understanding Virtual Reality: Interface, Application and Design (The Morgan Kaufmann Series in Computer Graphics)”. Morgan Kaufmann Publishers, San Francisco, CA, 2002
4. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013

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1. https://www.goodcore.co.uk/blog/Augmented reality/

2. https://www.educative.io/blog/Augmented/development-in-python#suited

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS202	L	T	P	C
COURSE NAME			ADVANCED JAVA PROGRAMMNG	3	1	1	5
C	P	A		L	T	P	H
3	0.5	0.5		3	1	2	6
PREREQUISITE			Java, Object Oriented Programming Concepts				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	To **understand**the Applications using Swing Components.	Cognitive Psychomotor	Understand Perception
CO2	**Illustrate** distributed applications using remote method invocation	Cognitive Psychomotor	Understand Perception
CO3	**Create** DATABASE Connectivity using Java database connectivity	Cognitive Psychomotor Affective	Create Orgination Receive
CO4	**Outline**the JavaScript language & the Document Object Model	Cognitive Psychomotor Affective	Analyze Perception Respond
CO5	**Appraise** the Well-Formed XML with different types of XML Schemas	Cognitive Psychomotor	Evaluate

Unit I INTRODUCTION — **12 Hours**

Java Swing - Features – Classes and Packages – MVC architecture – Swing basic components – Buttons – Labels – List – Combo box – Menu Simple AWT application using Swing Components.

Lab Exercise:

1. Create a Frame using AWT implement mouseClicked(), mouseEntered() and mouseExited() events.Frame should become visible when mouse enters it
2. Using AWT, create buttons, change background colors.

Unit II RMI — **12 Hours**

Remote Method Invocation and JDBC- RMI overview - RMI architecture - Example demonstrating RMI. Database Handling: Accessing Database using JDBC

Lab Exercise: Create a program to execute Select Query using JDBC and implement RMI server

Unit III JAVA IN WEB — **12 Hours**

Java Scripts: JavaScript language syntax, Built In Functions, HTML Forms, HTML DOM, XML: XML documents, XML schemes, and Extensible Style Language (XSL), Introduction to AJAX
Lab Exercise:Create a program to display cookie ID, display a String, create a Check boxes.

Unit IV SERVLET AND JSP — **12 Hours**

Servlet: Introduction to servlet - Developing and Deploying Servlets - Handling Request and Response - Reading Servlet Parameters - Cookies - Session Tracking. Java Server Pages: Basic JSP Architecture - Life Cycle of JSP - JSP Tags and Expressions – Directives- JSP applications. Java Creating and using JavaBean components –Setting and retrieving JavaBean components – Java Server Faces Application
Lab Exercise:Develop remote interface and implement your Java/RMI server and create your server

Unit V HIBERNATE, SPRING, STRUTS — **12 Hours**

Introduction to Hibernate – Advantages – Architecture –Spring Framework -Struts Framework: Introduction to Struts- Struts Architecture.

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. Herbert Schildt - JAVA 2 (The Complete Reference)- Ninth Edition, TMH, 2014
2. Jim Keogh, "The Complete Reference J2EE, Tata McGraw-Hill, 2002.

REFERENCES

1. Brian Cole, Robert Eckstein, James Elliott, Marc Loy, David Wood, Java Swing, O'Reilly Publishers, second edition, 2012
2. Patrick Naughton, "The Java Hand Book, Tata McGraw Hill, 2017.
3. KogentSolutionss, Java Server Programming Java Ee5 Black Book,Dreamtech Press, 2018

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1. https://www.tutorialspoint.com/javascript
2. https://www.tutorialspoint.com/java_xml
3. https://www.tutorialspoint.com/ajax
4. https://www.w3schools.com/

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS203	L	T	P	C
COURSE NAME			MACHINE LEARNING	3	1	1	5
C	P	A		L	T	P	H
3	0.5	0.5		3	1	2	6
PREREQUISITE			Artificial Intelligence, Fuzzy Logics				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Identify** and **explain** the objectives of artificial Intelligence	Cognitive Psychomotor	Remember Set
CO2	**Summarize** variousmachine learning models	Cognitive Psychomotor	Understand Perception
CO3	**Apply**the learning objective into Distance Based Models	Cognitive Psychomotor Affective	Apply Origination Receive
CO4	**Classify** the tree and Rule Models	Cognitive Psychomotor Affective	Analyze Perception Respond
CO5	**Analyzing**the idea about Reinforcement Learning	Cognitive Psychomotor	Analyze Mechanism

Unit I FOUNDATIONS OF LEARNING — **12 Hours**

Introduction Artificial Intelligence - Characteristics of AI – AI problems and Problem solving methods- Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound –bias and variance – learning curve.

Unit II LINEAR MODELS — **12 Hours**

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – generalization and over fitting – regularization – validation

Unit III DISTANCE-BASED MODELS — **12 Hours**

Nearest neighbor models – K-means – clustering around medoids – silhouettes – hierarchical clustering – k-d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta learning.

Unit IV TREE AND RULE MODELS — **12 Hours**

Decision trees – learning decision trees – ranking and probability estimation trees – Regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first -order rule learning

Unit V REINFORCEMENT LEARNING — **12 Hours**

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal - difference learning – active reinforcement learning – exploration – learning an action utility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control.

Lab Exercise :

1. Implement and demonstrate the FIND-S algorithm
2. Implement and demonstrate the candidate-Elimination algorithm
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm,
4. Build artificial Neural network by implementing the back propagation algorithm
5. Write a program to implement the naïve Bayesian classifier for a set of training data.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built in java classes /API can be used to write the programs.Calculate the accuracy, precision and recall for data set

7. Write a program to construct a Bayesian network considering medical data

8. Apply EM algorithm to cluster a set of data stored in a file.

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill Publication, 2nd Edition, 2011
2. Y. S. Abu - Mostafa, M. Magdon-Ismail, and H.-T. Lin, "Learning from Data", AMLBook Publishers, 2017.
3. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.

REFERENCES

1. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
2. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
3. D. Barber, "Bayesian Reasoning and Machine Learning", Cambridge University Press,2012..

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2.https://nptel.ac.in/courses/106/105/106105152/

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

Course Code			YCS204C	L	T	P	C
				3	1	0	4
Course Name			ARTIFICIAL INTELLIGENCE				
C	P	A		L	T	P	H
2.8	0	0.2		3	1	0	4

PREREQUISITE: Nil

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Analyse AI problems and Space Search	Cognitive	Remember
CO2	Discuss various search techniques	Cognitive	Understand
CO3	Apply Logic and relationships	Cognitive r Affective	Apply Receive
CO4	Illustrates the knowledge based on rules	Cognitive Affective	Analyze Respond
CO5	Describes expert system and various perceptions	Cognitive	Understand

UNIT I	Introduction:	9+3

AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems

UNIT II	Heuristic Search techniques:	9+3

Generate and Test - Hill Climbing- Best-First - Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

UNIT III	Using Predicate logic:	9+3

Representing simple facts in logic - Representing Instance and Is a relationships - Computable functions and predicates - Resolution.

UNIT IV	Representing knowledge using rules:	9+3

Procedural Vs Declarative knowledge – Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.

UNIT V	Game playing	9+3

The minimax search procedure – Expert System - Perception and Action

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	15	-	60

TEXT BOOKS:

1. Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.

REFERENCES:

1. S. Rajasekaran and G.A.V. Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.Emereo Pty Limited, July 2008.
2. Ahmar, Abbas, “Grid Computing - A Practical Guide to technology and Applications”, Charles River media, 2003.
3. Vojislav Kecman, “Learning & Soft Computing Support Vector Machines, Neural Networks, and Fuzzy Logic Models”, Pearson Education, New Delhi,2006

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc.	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

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

Course Code			**YCS205C**	**L**	**T**	**P**	**C**
Course Name			**PERVASIVE COMPUTING**	**3**	**1**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**H**
2.5	**0.3**	**0.2**		**3**	**1**	**0**	**4**
PREREQUISITE:			Computer Networks				

COURSE OUTCOMES:

Course outcomes: After the completion of the course, students will be able to		**Domain**	**Level**
CO1:	***Understand*** the basics of pervasive computing	Cognitive Psychomotor	Remember Set
CO2	***Apply*** the pervasive computing techniques for human machine interfaces.	Cognitive Psychomotor	Understand Perception
CO3	***Design*** web-based applications using XML, WAP and WML.	Cognitive Psychomotor Affective	Apply Origination Receive
CO4	***Apply*** the pervasive computing techniques for speech-based applications.	Cognitive Psychomotor Affective	Apply Perception Respond
CO5	D***escribe*** the PDA characteristics and standards.	Cognitive Psychomotor	Annalyze Mechanism

Unit - IPervasive Computing:	**12 Hours**
Past, Present and Future - Pervasive Computing Market – mBusiness – Application examples: Retail, Airline check-in and booking – Health care – Car information system – E-mail access via WAP and voice.	
Unit –IIDevice Technology:	**12 Hours**
Hardware – Human Machine Interfaces – Biometrics – Operating Systems – Java for Pervasive devices.	
Unit –IIIDevice Connectivity	**12 Hours**
Protocols – Security – Device Management - Web Application Concepts: WWW architecture – Protocols – Transcoding - Client Authentication via Internet.	
Unit - IVWAP and Beyond	**12 Hours**
Components of the WAP architecture – WAP infrastructure – WAP security issues – WML – WAP push – Products – i-Mode - Voice Technology: Basics of Speech recognition- Voice Standards – Speech applications – Speech and Pervasive Computing.	
Unit – V PDA	**12 Hours**
Device Categories – PDA operation Systems – Device Characteristics – Software Components - Standards – Mobile Applications - PDA Browsers - Pervasive Web Application architecture: Background –	

Development of Pervasive Computing web applications - Pervasive application architecture.			
HOURS	**LECTURE**	**TUTORIAL**	**TOTAL**
	45	**15**	**60**

TEXT BOOKS

1. Pervasive Computing, Technology and Architecture of Mobile Internet Applications, JochenBurkhardt, Horst Henn, Stefan Hepper, Thomas Schaech & Klaus Rindtorff, Pearson Education, 2006.

REFERENCES

1. Fundamentals of Mobile and Pervasive Computing, Frank Adelstein, Sandeep KS Gupta, Golden Richard III, Loren Schwiebert, McGraw Hill edition, 2006.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc.	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

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

COURSE CODE			**YCS301**	**L**	**T**	**P**	**C**
COURSE NAME			**DEEP LEARNING**	**4**	**1**	**0**	**5**
C	**P**	**A**		**L**	**T**	**P**	**H**
3	**0.5**	**0.5**		**4**	**1**	**0**	**5**
PREREQUISITE			Artificial Intelligence				

COURSE OUTCOMES:

Course outcomes:		**Domain**	**Level**
CO1	**Describe** the mathematical, statistical and computational challenges of building neural networks	Cognitive Psychomotor	Remember Set
CO2	**Understand** dimensionality reduction techniques	Cognitive Psychomotor	Understand Perception
CO3	**Manipulate** deep learning techniques to support real-time applications	Cognitive Psychomotor Affective	Apply Origination Receive
CO4	**Analyze**optimization and generalization techniques in deep learning	Cognitive Psychomotor Affective	Analyze Perception Respond
CO5	**Illustrate** neural and spatial transformers	Cognitive Psychomotor	Analyze Mechanism
Unit I INTRODUCTION			**12 Hours**

Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates
Unit II DEEP NETWORKS **12 Hours**
History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow NetworksConvolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning
Unit III DIMENTIONALITY REDUCTION **12 Hours**
Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization.
Unit IV OPTIMIZATION AND GENERALIZATION **12 Hours**
Optimization in deep learning– Non-convex optimization for deep networks- Stochastic OptimizationGeneralization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience
Unit V CASE STUDY AND APPLICATIONS **12 Hours**
Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint DetectionBioInformatics- Face Recognition- Scene Understanding- Gathering Image Captions

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. CosmaRohillaShalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

REFERENCES

1. K. P. Murphy, “Machine Learning: A probabilistic perspective”, MIT Press, 2012.
2. C. M. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.
3. D. Barber, “Bayesian Reasoning and Machine Learning”, Cambridge University Press,2012

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https://nptel.ac.in/courses/106/106/106106184

https://onlinecourses.nptel.ac.in/noc20_cs62

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS302	L	T	P	C
COURSE NAME			WIRELESS NETWORKS	3	1	1	5
C	P	A		L	T	P	H
3	0.5	0.5		3	1	2	6
PREREQUISITE			Computer Networks				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Define** the basic WSN technology and supporting protocols, with emphasis place on standardization basic sensor systems and provide a survey of sensor technology.	Cognitive Psychomotor	Remember Perception
CO2	**Illustrate** medium access control protocols and address physical layer issues.	Cognitive Psychomotor	Understand Perception
CO3	**Examine** key routing protocols for sensor networks and main design issues.	Cognitive Psychomotor Affective	Apply Perception Receive
CO4	**Analyse** transport layer protocols for sensor networks, and design requirements.	Cognitive Psychomotor	Analyse Mechanism
CO5	**Represent** the Sensor management, sensor network middleware, operating systems.	CognitivePsychomotor	Understand Perception

Unit I Wireless Networks	**12 Hours**
Introduction Evolution of wireless networks – Challenges - Transmission fundamentals: Analog and digital data transmission - Transmission media - Modulation techniques for wireless systems - Multiple access for wireless systems - Performance increasing techniques for wireless networks	
Unit II Wireless LAN	**12 Hours**
Introduction to Wireless LANs – WLAN Equipment, Topologies, Technologies, IEEE 802.11 WLAN – Architecture and Services - Physical Layer - MAC Sub Layer –MAC Management Sub Layer, Other IEEE 802.11 Standards.	
Unit III Wireless Personal Area Networks	**12 Hours**
Introduction – Bluetooth: Architecture - Protocol Stack - Physical Connection – Mac mechanism – Frame format – Connection management –Low Rate and High Rate WPAN, Zig Bee Technology IEEE 802.15.4: Components – Network topologies – PHY – MAC	
Unit IV Ad-hoc Wireless Networks	**12 Hours**
Introduction- Characteristics of Adhoc Networks - Classifications of MAC Protocols: Connection Based protocols, Reservation Mechanism - Table driven Routing protocols: DSDV, WRP - On Demand routing protocols: DSR, AODV,TORA –Routing Protocol with Efficient Flooding Mechanism: OLSR - Hierarchical routing protocols – CBRP, FSR.	
Unit V Wireless Sensor Networks	**12 Hours**
Introduction - Challenges for wireless sensor networks - Comparison of sensor network with ad-hoc network - Single node architecture: Hardware components - Energy consumption of sensor nodes - Network architecture: Sensor network scenarios - Design principles – Operating systems.	

Lab Exercise:

1. 802.11 Association and Channels
2. Wireless fidelity
3. Multi-hop routing-TCP Performance
4. Dynamic Ad-hoc Routing

5. RFID Basics
6. Data throughput
7. Rate Control
8. Back pressure Scheduling
9. MAC Contention Window and RTS
10. 802.11 fairness and comparison.

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. Nicopolitidis P, "Wireless Networks", John Wiley and Sons, New York, 2010.
2. Vijay K Garg, Wireless Communication and Networking, Morgan Kaufmann Publishers 2010.
3. Siva Ram Murthy C.,Manoj B S, "Ad Hoc Wireless Networks: Architectures and Protocols", Prentice Hall, 2012.

REFERENCES

1. Holger Karl and Andreas Willig, "Protocol and Architecture for Wireless Sensor Networks", John Willey Publication, 2011.
2. KavehPahlavan, "Principles of wireless networks", Prentice-Hall of India, 2013.

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1. https://www.te.com/usa-en/industries/sensor-solutions/insights/sensors-sleep-apnea-whitepaper.html
2. https://www.bluetooth.com/blog/smart-building-use-cases/
3. https://wballiance.com/wp-content/uploads/2019/03/Case-Study_VAST-Networks-Mobile-DataOffload.pdf
4. https://www.postscapes.com/agtech/#case-studies

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

COURSE CODE			YCS303	L	T	P	C
COURSE NAME			BIG DATA AND ANALYTICS	3	1	1	5
C	P	A		L	T	P	H
3	0.5	0.5		3	1	2	6
PREREQUISITE			Data Mining and Data warehousing				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	***Describe*** the building blocks of Big Data.	Cognitive Psychomotor	Remember Set
CO2	***Understand*** the fundamentals of various big data analysis techniques and its various applications.	Cognitive Psychomotor	Understand Perception
CO3	***Explain*** the Difference between SQL and NoSQL and its types and various NoSQL databases.	Cognitive Psychomotor Affective	Apply Origination Receive
CO4	***Classify***the components of Hadoop and its architecture.	Cognitive Psychomotor Affective	Analyze Perception Respond
CO5	***Prescribe*** the HADOOP and Map Reduce technologies associated with big data analytics Explore on Big Data applications.	Cognitive Psychomotor	Create Mechanism

Unit I INTRODUCTION TO BIG DATA — **12 Hours**

Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment.

UNIT II BIG DATA ANALYTICS — **12 Hours**

Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment.

Unit III BIG DATA TECHNOLOGIES AND DATABASES — **12 Hours**

Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of apache cassandra and its needs, Characteristics of Cassandra

Unit IV HADOOP FOUNDATION FOR ANALYTICS — **12 Hours**

History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures.

Unit V HADOOP MAP REDUCE AND YARN FRAMEWORK — **12 Hours**

Introduction to Map Reduce, Processing data with Hadoop using Map Reduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, Map Reduce application, Data serialization and Working with common serialization formats, Big data serialization formats.

Lab exercise:

1. File management task in Hadoop
2. Word count Map reduce program to understand Map reduce Paradigm
3. Map reduce program to analyze time-temperature statistics and generate report
4. Implement Matrix multiplication with Hadoop Map reduce
5. Hive databases, tables, views functions and indexes

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

SeemaAcharya and SubhashiniChellappan, "Big Data and Analytics", Wiley India Pvt. Ltd., 2016

REFERENCES

1. "Big Data" by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
2. Minelli, M., Chambers, M., &Dhiraj, A. (2013). Big data, big analytics: emerging business intelligence and analytic trends for today's businesses. John Wiley &Sons.Michael, ISBN no: 9781118-14760-354995.
3. Sadalage, P. J., & Fowler, M. (2013). NoSQL distilled: a brief guide to the emerging world of polyglot persistence. Pearson Education. ISBN no: 13:978-0-321-82662-6.
4. "Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics" by SoumendraMohanty, MadhuJagadeesh and HarshaSrivatsa, Apress Media, Springer Science + Business Media New York, 2013.
5. "Hadoop: The definitive Guide", Tom White, O'Reilly Media, 2010.
6. Tom White, (2012). Hadoop: The Definitive Guide, (Third Edition), O'Reilley. ISBN no: 978-1-491-90163-2 4.
7. Eric Sammer, (2012). Hadoop Operations, (First Edition) O'Reilley., ISBN no: 978- 1149327057
8. Alan Gates, (2011). Programming Pig, (First Edition),O'Reilley. ISBN no: 978-1- 449-302641.
9. Alex Holmes, (2012). Hadoop in Practice, Manning Publ. ISBN no: 9781617292224.
10. ECapriolo, D Wampler, and JRutherglen, (2012), Programming Hive, O'Reilley.

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1. Hadoop: http://hadoop.apache.org/,
2. Hadoop:https://www.edureka.co/blog/hadoop-tutorial
3. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
4. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

Course Code			YCS304C	L	T	P	C
				3	1	0	4
Course Name			BLOCKCHAIN MANAGEMENT				
C	P	A		L	T	P	H
2.8	0	0.2		3	1	0	4

PREREQUISITE:

Knowing Blockchain technology and its application in various domains, Knowledge of Decentralized Applications · Decentralization.

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	**Discuss** the basic concepts and technology used for blockchain	Cognitive	Understand
CO2	**Describe** the primitives of the distributed computing and cryptography related to blockchain.	Cognitive	Remember
CO3	**Organize** the concepts of Bitcoin and their usage and Implement Ethereum block chain contract.	Cognitive Affective	Apply Organization
CO4	**Apply** security features in blockchain technologies	Cognitive	Apply
CO5	**Design** smart contract in real world applications	Cognitive	Create

UNIT I		9+3

Block Chain :Introduction to crypto economics - Byzantine agreement - Extensions of BFT (Ripple, Stellar) - Blockchain Dynamics - Public and private blockchains - Hard and soft forks - Sharding Side chain - Verifiers – trust, cost and speed - Proof of work and other models.s

UNIT II		9+3

Smart Contracts - Distributed Virtual Machines, Smart Contracts, Oracles - Basics of contract law - Smartcontracts and their potential Trust in Algorithms, - Integration with existing legal systems - OpenZeplin, OpenLaw- Writing smart contracts.

UNIT III		9+3

Cryptography and Other Technologies: Application of Cryptography to Blockchain - Using hash functions to chain blocks - Digital Signatures to sign transactions - Using hash functions for Proof-of-Work. - Putting the technology together – examples of implementations with their tradeoffs.

UNIT IV		9+3

Implementation: Supply Chain and Identity on Blockchain - Blockchain interaction with existing infrastructure – Trust in blockchain data - Scaling Blockchain – reading and writing data. Differentiate nodes, sparse data and Merkle trees - Fixing on the fly – Layer 2 solutions - Lightning and Ethereum state channels

UNIT V		9+3

Bitcoin - The big picture of the industry – size, growth, structure, players - Bitcoin versus Crypto-currencies versus Blockchain - Distributed Ledger Technology (DLT) - Strategic analysis of the space –Major players: Blockchain platforms, regulators, application providers, etc. - Bitcoin, HyperLedger, Ethereum, Litecoin, Zcash .

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	15	-	60

TEXT BOOKS:

1. Blockchain Revolution: How the Technology BehindBitcoin and Other Cryptocurrencies Is Changing the World, Don Tapscott and Alex Tapscott, Portfolio, 2018

REFERENCES:

1. The Age of Cryptocurrency: How Bitcoin and the Blockchain Are Challenging the Global Economic Order, Paul Vigna and Michael J. Casey, Picador. 2016

2. Blockchain Technology Explained: The Ultimate Beginner's Guide AboutBlockchain Wallet, Mining, Bitcoin, Ethereum, Litecoin, Zcash, Monero, Ripple, Dash, IOTA And Smart Contracts, Alan T. Norman, CreateSpace Independent Publishing Platform, 2017

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

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

Course Code			YCS305B	L	T	P	C
Course Name			NATURAL LANGUAGE PROCESSING	3	1	0	4
C	P	A		L	T	P	H
2.5	0.7	0.3		3	1	0	4

PREREQUISITE: Nil

COURSE OUTCOMES:		Domain	Level
CO1	**Define** the Language Processing and vector space representation	Cognitive Psychomotor	Remember Set
CO2	**Describe**s Transducers and Matrix Factorization	Cognitive Psychomotor	Understand Guided Response
CO3	**Organize**phonological rules and spelling errors in NLP	Cognitive Affective	Apply Receiving
CO4	**Examine** the correct Spelling and Pronunciation in NLP	Cognitive Affective	Apply Responding
CO5	Categorize the various models and algorithm for speech recognition	Cognitive	Analyze

Unit - I INTRODUCTION OF NLP **12 Hours**

Knowledge in Speech and Language processing,ambiguity and models and algorithm,language and understanding,brief history. Regular Expressions,Automata,Similarity Computation: Regular Expressions,patterns,FA,FormalLanguage,NFSA,Regular Language and FSAs, Raw Text Extraction and Tokenization, Extracting Terms from Tokens, Vector Space Representation and Normalization, Similarity Computation in Text.

Unit – II MORPHOLOGY AND FINITE-STATE TRANSDUCERS **12 Hours**

Inflection,Derivational Morphology, Finite-State Morphological Parsing, The Lexicon and Morphotactics, Morphological Parsing with FiniteState Transducers, Combining FST Lexicon and Rules, Lexicon-free FSTs: The Porter Stemmer, Human Morphological Processing. Matrix Factorization and Topic Modeling: Introduction, Singular Value Decomposition, Nonnegative

Matrix Factorization, Probabilistic Latent Semantic Analysis, Latent Dirichlet Allocation.	
Unit – IIICOMPUTATIONAL PHONOLOGY AND TEXT-TO-SPEECH	**12 Hours**
Speech Sounds and Phonetic Transcription, The Phoneme and Phonological Rules, Phonological Rules and Transducers, Advanced Issues in Computational Phonology, Machine Learning of Phonological Rules, Mapping Text to Phones for TTS, Prosody in TTS. Probabilistic Models of Pronunciation and Spelling: Dealing with Spelling Errors, Spelling Error Patterns, Detecting NonWord Errors, Probabilistic Models, Applying the Bayesian method to spelling, Minimum Edit Distance, English Pronunciation Variation, The Bayesian method for pronunciation and Weighted Automata, Pronunciation in Humans.	
Unit - IV N-GRAMS	**12 Hours**
Counting Words in Corpora, Simple (Unsmoothed) N-grams, Smoothing, Backoff, Deleted Interpolation, N-grams for Spelling and Pronunciation, Entropy .	
Unit – V HMMS AND SPEECH RECOGNITION	
Speech Recognition Architecture, Overview of Hidden Markov Models, The Viterbi Algorithm Revisited, Advanced Methods for Decoding, Acoustic Processing of Speech, Computing Acoustic Probabilities, Training a Speech Recognizer, Waveform Generation for Speech Synthesis, Human Speech Recognition.	

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS

1. Daniel Jurafsky and James H.Martin Speech and Language Processing(2nd Edition),Prentice Hall:2 edition,2008.
2. Machine Learning for Text by CharuC.Aggarwal,Springer,2018 edition
3. Foundations of Statistical Natural Language Processing by Christopher D.Manning and HinrichSchuetze,MIT press, 1999

REFERENCES

1. Steven Bird,Ewan Klein and Edward Loper Natural Language Processing with Python,O'Reilly Media;1 edition,2009
2. Roland R.Hausser, Foundations of Computational Linguistics:HumanComputer Communication in Natural Language,Paperback,MIT press,2011

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc.	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

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

YSE901			MOBILE APPLICATION DEVELOPMENT	L	T	P	C
				3	0	1	4
C	P	A		L	T	P	H
2.5	0.25	0.25		3	0	2	5

PREREQUISITE: YSE303, YSE503

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Android development	Cognitive	Remember
CO2	***Summarize*** the knowledge on java, xml with android and ***detect*** about the android development.	Cognitive Psychomotor	Understand Perception
CO3	***Manipulate*** and utilize the layout, resources and user interface.	Cognitive Affective	Application Receiving
CO4	To ***know*** about the database in android	Cognitive	Understand
CO5	***Design*** and test the android environment using exception handling, accessing the cloud data.	Cognitive	Create

UNIT I	INTRODUCTION	9+6

Overview of JAVA Programming – Inheritance – Polymorphism – Android software layers – Android libraries – Components of android application – Application life cycle – Android studio – android project structure – Android manifest file – Structure of manifest file

Lab: 1. Installing Android
2. Create a simple application

UNIT II	ANDROID SDK TOOLS AND OTHERS	9+6

Android SDK tools – activity – methods to remember – Fragments – views – List vies and list activity – Intents and intent filter – native action

Lab: 1. Working with fragments
2. Working with Intents and intent filters.
3. Creating contact based application.

UNIT III	ANDROID LAYOUT, RESOURSES AND UI	9+6

Views – Layout – customized view – Resources – themes and style – material design – User interaction – dialogs – Activities – Toasts – menus – context menus – Additional menu – pop up menu

Lab:

1. Working with views
2. Creating Dialogs and toasts
3. Working with Pop-up Menu

UNIT IV	ANDROID STORAGE, SQLite and NOTIFICATIONS	9+6

Android storage options – File I/O – connecting to the internet – Databases in android – content providers – custom content provider – creating notifications – actions – expandable notification – layouts – priority

Lab: 1. Quotes provider app
2. SQLite database app
3. Implement notification

UNIT V	ANDROID ADAVANCED DEVELOMENT	9+6

Exception handling – Location based services – finding your current location using GPS -Accessing cloud storage – Bluetooth – NFC – managing WiFi – Telephony and SMS.

Lab: 1. Working with exception handling

2. Finding your location using GPS.
3. Bluetooth communication / SMS communication..

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	0	30	75

TEXTBOOKS

1. Professional Android 4 Application Development, 3rd edition, reto meier, wiley publication 2012.

REFERENCES:

1. Programming Android, 1st Edition, Zigurd Mednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura, Oreilly publications, 2011.

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1. https://www.tutorialspoint.com/mobile_development_tutorials.htm
2. https://www.theserverside.com/tutorial/Mobile-application-development-tutorial

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc. SE	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	2	1	1	1
CO2	3	2	2	2	2	2	2	2	1
CO3	2	2	2	2	3	2	2	2	1
CO4	3	2	2	2	2	2	2	3	1
CO5	3	3	3	3	3	3	3	3	1
Average	3	2	2	2	2	2	2	2	1

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

YSE902			CYBER SECURITY	L	T	P	C
				3	0	0	3
C	P	A		L	T	P	H
3	0	0		3	0	0	3

PREREQUISITE: YSE403

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Describe*** the importance of information systems and ***Classify*** the threats and attacks in networks.	Cognitive	Remember Understand
CO2	***Describe*** and ***Defend*** the concepts of information security.	Cognitive	Remember Understand
CO3	***Define*** and ***Defend*** the project activity planning and risk management.	Cognitive	Remember Understand
CO4	***Predict*** and ***Apply*** the appropriate biometric system for security.	Cognitive	Understand Apply
CO5	***Identify*** and ***Apply*** the perfect law and Act in real life.	Cognitive	Remember Apply

UNIT I INTRODUCTION AND THREATS TO INFORMATION SYSTEMS **9**

History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages. Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices ,authentication Service Security, Security Implication

for organizations, Laptops Security Concepts. Brief review of Internet Protocols-TCP/IP, IPV4, IPV6. Functions of various networking components-routers, bridges, switches, hub, gateway and Modulation Techniques.

UNIT II	BUILDING BLOCKS OF INFORMATION SECURITY	9

Basic Principles of Information Security, Confidentiality, Integrity, Availability and other terms in Information Security, Information Classification and their Roles. Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards.

UNIT III	PHYSICAL AND BIOMETRIC BASED SECURITY	9

Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics application, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges.Models for Information Security- ISO 27001, SSE-CMM, Information Security Vs Privacy.

UNIT IV	CRYPTOGRAPHY, FIREWALLS, NETWORK SECURITY, INTRUSION DETECTION AND VPN	9

Cryptography-Applications and its roles, Digital Signature. Firewalls –need, proxy servers, Design and Implementation Issues, Policies. Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection. Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.

UNIT V	LAW, LEGAL FRAMEWORK AND ETHICS	9

Cyber Crime, Information Security and Law, Types & overview of Cyber Crimes, Cyber Law Issues in E-Business Management, Overview of Indian IT Act, Ethical Issues in Intellectual property rights, Copy Right, Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Issues in ethical hacking.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45			45

TEXT BOOKS

1. Nina S.Godbole, 2009. "*Information Systems Security*", John wiley & sons India Private Limited,
2. Mark Merkow, Jim Breithaupt, "*Information Security*", Pearson Education.
3. Yadav, D S., 2001. "*Foundations of Information Technology*", New Age International
4. publisher, Delhi.

REFERENCES:

1. Corey Schou, Daniel Shoemaker, 2006. "*Information Assurance for the Enterprise*", Tata McGraw Hill.
2. Vivek Sood, 2001. "Cyber Laws Simplified", Mc Graw Hill Education private Limited.
3. Steven M. Furnell, 2005 ., "Computer Insecurity", Springer Publisher.

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1. https://www.cryptool.org/en/
2. https://www.metasploit.com/
3. http://sectools.org/tool/hydra/
4. http://www.hping.org/
5. http://www.winpcap.org/windump/install/
6. http://www.tcpdump.org/
7. https://www.wireshark.org/
8. https://ettercap.github.io/ettercap/
9. https://www.concise-courses.com/hacking- tools/top-ten/
10. https://www.cirt.net/Nikto2
11. http://sqlmap.org/

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc. SE	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	1	1	1	1	2	1	1	1
CO2	3	2	2	2	2	2	2	2	1
CO3	2	2	2	2	3	2	2	2	1
CO4	3	2	2	2	2	2	2	3	1
CO5	3	3	3	3	3	3	3	3	1
Average	3	2	2	2	2	2	2	2	1

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

YSE903			**SOFTWARE RELIABILITY**	**L**	**T**	**P**	**C**
				3	**0**	**0**	**3**
C	**P**	**A**		**L**	**T**	**P**	**H**
3	**0**	**0**		**3**	**0**	**0**	**3**

PREREQUISITE: YSE206

COURSE OUTCOMES:

Course Outcomes	**Domain**	**Level**
After the completion of the course, students will be able to		
CO1: ***Recognize*** the significance of Software Reliability.	Cognitive	Remember
CO2: ***Express*** the knowledge on SDLC	Cognitive	Understand
CO3: ***Estimate*** the understanding of Software Quality Management.	Cognitive	Apply
CO4: ***Recognize*** the significance of Software Reliability Tools	Cognitive	Remember
CO5: ***Express*** the knowledge on Software testing .	Cognitive	Understand

UNIT I	**INTRODUCTION TO SOFTWARE RELIABILITY**	**9**

Software Reliability Definitions - software disasters - Errors - faults - failures - different views of software reliability – software requirements specification - Causes of unreliability in software - Dependable systems: reliable, safe, secure, maintainable, and available - Software maintenance

UNIT II	**SOFTWARE RELIABILITY IMPROVEMENT**	**9**

The phases of a Software Project - Monitoring the development process – The software life cycle models - oftware engineering - Structured Analysis and structured Design - Fault tolerance - Inspection - Software ost and schedule.

UNIT III	**SOFTWARE QUALITY MANAGEMENT**	**9**

Software quality modeling - Diverse approaches and sources of information - Fault avoidance, removal and tolerance - Process maturity levels (CMM) - Software quality assurance (SQA) - Monitoring the quality of software - Total quality management (TQA) - Measuring Software Reliability - The statistical approach - Software reliability metrics.

UNIT IV	**SOFTWARE RELIABILITY TECHNIQUES AND TOOLS**	**9**

Data Trends - Complete prediction Systems - overview of some software reliability models - The

recalibration of the models - Analysis of model accuracy - Reliability growth models and trend analysis - Software Costs Models - Super models		
UNIT V	**SOFTWARE RELIABILITY ENGINEERING PRACTICE**	**9**
Testing and maintaining more reliable software –logical testing – functional testing – algorithm testing – regression testing - fault tree analysis – failure mode effects and critical analysis – reusability - case studies		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	0	0	45

TEXTBOOKS

1. J.D. Musa, A. Iannino and K.Okumoto, Software Reliability, Measurement, Prediction, Application, McGraw Hill, 1990.
2. J.D. Musa, Software Reliability Engineering, McGraw Hill, 1998.

REFERENCES:

1. Michael R. Lyer, Handbook of Software Reliability Engineering, McGraw Hill, 1995.Xie,
2. Software Reliability Modelling, World Scientific, London, 1991.

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1. https://users.ece.cmu.edu/~koopman/des_s99/sw_reliability/presentation.pdf
2. https://www.slideshare.net/AnandKumar87/software-reliability-11841804

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc. SE	PO								PSO	
	1	2	3	4	5	6	7	8	1	2
CO1	0	1	1	1	1	0	0	1	1	1
CO2	1	3	2	0	0	1	1	1	2	2
CO3	0	2	1	1	1	0	0	1	2	2
CO4	1	1	1	1	0	2	2	1	2	2
CO5	0	2	2	0	0	2	2	2	3	3
Average	0	2	2	1	0	1	1	1	2	2

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

YSE904			USABILITY ENGINEERING	L	T	P	C
				3	0	0	3
C	P	A		L	T	P	H
3	0	0		3	0	0	3

PREREQUISITE: YSE205

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Identify*** the importance of Software Reuse and its components	Cognitive	Remember
CO2	***Interpret*** the understanding of Design Patterns	Cognitive	Understand
CO3	Clearly ***Understand*** the concepts of Structural Patterns	Cognitive	Understand
CO4	***Identify*** the variousBehavioral Patternsand its functions	Cognitive	Remember
CO5	***Distinguish***the various Architectural patterns.	Cognitive	Understand

UNIT I	**INTRODUCTION**	**9**
Software reuse success factors, Reuse driven software engineering business, Object oriented software engineering, applications and component sub systems, use case components, object components.		
UNIT II	DESIGN PATTERNS	**9**
Design Patterns – Introduction, Creational patterns, factory, factory method, abstract factory, singleton, builder prototype.		
UNIT III	STRUCTURAL PATTERNS	**9**

Structural Patterns- Adapters, bridge, composite, decorator, façade, flyweight, proxy.Behavioral Patterns – Chain of responsibility, command, interpreter.		
UNIT IV	BEHAVIORAL PATTERNS	**9**
Behavioral Patterns – Iterator, mediator, memento, observer,stazte, strategy, template, visitor, other, design patterns- Whole part, master- slave,view handler, forwarder- receiver, client – dispatcher- server, publisher – subscriber.		
UNIT V	ARCHITECTURAL PATTERNS	**9**
Architectural patterns – Layers,pipes and filters, black board, broker, model - view controller ,presentation- abstraction – control, micro kernel, reflection.		

LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
45	**-**	**-**	**45**

TEXTBOOKS

1. Ivar jacabson, Martin Griss, Patrick Hohson – Software Reuse. Architecture, Process and Organization for Bussiness Success, ACM Press, 1997.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – Design Patterns- Addison, 1995, Pearson Education.

REFERENCES:

1. Frank Buschmann etc. – Pattern Oriented Software Architecture – Volume 1, Wiley 1996.
2. James W Cooper – Java Design Patterns, a tutorial, Addison 2000, Pearson Education

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1. https://dl.acm.org/citation.cfm?id=60341
2. www.cs.toronto.edu/~yijun/ece450h/handouts/lecture8x4.pdf

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc. SE	**PO**								**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**
CO1	2	2	2	2	2	1	1	2	2	2
CO2	2	3	3	3	3	1	1	3	3	3
CO3	2	3	3	3	3	1	1	3	3	3
CO4	2	3	3	3	3	1	1	3	3	3
CO5	2	3	3	3	3	1	1	3	3	3
Average	**2**	**3**	**3**	**3**	**3**	**1**	**1**	**3**	**3**	**3**

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

YSE905			**INTERNET OF THINGS**	**L**	**T**	**P**	**C**
				3	**1**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**H**
2.5	**0.5**	**0**		**3**	**1**	**0**	**4**

PREREQUISITE: YSE403

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Identify*** the components of IOT and learn the basic issues, policy and challenges in the Internet	Cognitive Psychomotor	Remember Perception

CO2	***Design*** the portable device , program the sensors and microcontrollers	Cognitive	Create
CO3	***Perceive*** the significance of ***build***ing the software agents in the real time environments	Cognitive Psychomotor	Create Perception
CO4	***Formulate*** and ***Establish*** the cloud based communication through wifi/ Bluetooth	Cognitive Psychomotor	Create Set
CO5	***Combine*** the needed internet resources and implement in the business model	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**9+3**
Definition – phases – Foundations – Policy– Challenges and Issues - identification - security – privacy. Components in internet of things**:** Control Units – Sensors – Communication modules – Power Sources – Communication Technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks – Mobile Internet – Wired Communication		
UNIT II	**PROGRAMMING THE MICROCONTROLLER FOR IOT**	**9+3**
Basics of Sensors and actuators – examples and working principles of sensors and actuators –Cloud computing and IOT – Arduino/Equivalent Microcontroller platform – Setting up the board -Programming for IOT – Reading from Sensors Communication:Connecting microcontroller with mobile devices – communication through bluetooth and USB – connection with the internet using wifi / ethernet		
UNIT III	**IOT PROTOCOLS**	**9+3**
Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security		
UNIT IV	**WEB OF THINGS**	**9+3**
Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture		
UNIT V	**INTERNET OF EVERYTHING**	**9+3**
Differences Internet of Things and Internet of Everythings – IoE at a glance –Internet of Everything: Data, Networks and opportunities-Application - IoE for cities connecting people, process and data		

LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
45	**15**		**60**

TEXTBOOKS

1. Charalampos Doukas , Building Internet of Things with the Arduino, Create space, April 2002
2. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011

REFERENCES:

1. Luigi Atzor et.al, “The Internet of Things: A survey, “, Journal on Networks, Elsevier Publications, October, 2010
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010 4.
4. 6.The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
5. 7. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012

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1. http://postscapes.com
2. http://www.theinternetofthings.eu/what-is-the-internet-of-things

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

M.Sc. SE	PO								PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**
CO1	1	2	2	1	1	0	0	1	1	2
CO2	1	3	1	2	2	0	1	2	2	2
CO3	0	3	1	2	2	1	1	2	2	2
CO4	0	3	0	2	2	0	1	2	2	2
CO5	0	3	2	1	3	1	1	2	3	2
Average	1	2	1	2	2	1	1	2	2	2

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