PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

PERIYAR MANIAMMAI
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
Established Under Sec. 3 of UGC Act, 1956 • NAAC Accredited
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Criterion 1 – Curricular Aspects

Key Indicator	1.1	Curriculum Design and Development
Metric	1.1.2	Percentage of Programmes where syllabus revision was carried out during the 2023-24

Department of Software Engineering

Sl. No.	Programme Code	Programme Name	Year of Introduction	Year of revision	Percentage of Syllabus content added or replaced
1	169	B.Sc (Computer Science)	2019-20	2023-24	50%

S.No	Contents
1.	Minutes of Board of Studies
2.	Extracts of minutes of the Academic Council Meeting
3.	Curriculum and Syllabus of the programme – Before Revision
4.	Curriculum and Syllabus of the programme – After Revision

Legend : Highlighted Color - Red – Indicates courses which are removed from syllabus before revision

Highlighted Color - Green – Indicates courses which are added into syllabus after revision

1. **Minutes of Board of Studies – B.Sc Computer Science held on 14.06.2023**

DEPARTMENT OF SOFTWARE ENGINEERING
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PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

Board of Studies Members

Date : 14.06.2023

Time : 10.30 AM to 1.00 PM

Programme : B.Sc Computer Science

Members Present

S.No	Name	Designation	Representing	Signature
01	Dr.D.Maghesh Kumar	Asso.Prof & HOD/SE	Chair Person	14.6.23
02	Dr.J.Jeyachidra	Professor/CSA & Dean-FCSE	Member	
03	Dr.D.Thaiyalnayaki	Asst.Prof(SG)/ Dept of Civil Engg.	Member	14.6.23
04	Dr.S.Bhuvanehwari	Asso.Prof & HOD /Maths	Member	14/6/23
05	Dr.K.Kesavan	Asst.Prof & HOD/Physics	Member	
06	Dr.Saranya	Asst.Prof , Department of English	Member	for
07	Dr.K.Mohankumar	Asso.Prof & HOD PG Research Department of Computer Science, Rajah Serfoji Govt. College,Thanjavur	Member (Academia)	
08	Mr.M. Balasubra Maniyan	Graphic Designer Ruthram 360, Trichy	Member (Industry)	
09	Dr.P.Anusha	Asst.Prof(SS)/ Department of Software Engineering	Member	
10	Dr.M.Chandra Kumar Peter	Asst.Prof(SG)/ Department of Software Engineering	Member	
11	Mr.M.Gunasekaran	Student II-M.Sc Computer Science	Member	

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PERIYAR MANIAMMAI

MINUTES OF THE BOARD OF STUDIES

B.Sc. Computer Science Programme

(Regulations 2023)

Date: 14.06.2023 **Time: 11:00 AM** **Venue: Software Engineering Department**

Agenda:

The main objective of this is to prepare a comprehensive course structure for undergraduate Computer Science programme.

It is a student centric framework where they are expected to learn fundamentals of computer science along with the latest trends and techniques.

Points to be discussed:

1. Reframing Graduate attributes, Program Outcomes, Course Outcomes, Mappings and Curriculum Alignment Matrix.
2. Framing Curriculum for B.Sc. (Computer Science) Degree programme based on the LOCF (Learning Outcome based Curriculum Framework) recommended by UGC.
3. Developing Syllabus from I - VI semesters for B.Sc. (Computer Science) Degree programme.

The members of Board of studies of Department of Software Engineering met on 14.06.2023 and discussed and framed the curriculum and syllabus for B.Sc. (Computer Science) programme for Regulation 2023.

I FEEDBACK COLLECTED, ANALYZED AND ACTION TAKEN

Alumni students	: Yes
Employers	: Yes
Students	: Yes
Course Teachers	: Yes

Important observations made and addressed in BOS and modified as per the Learning Outcomes-based Curriculum Framework (LOCF) recommended by UGC.

1. Separating the laboratory and theory for the entire Theory cum Lab courses as per the feedback given. Then separate course code given for the laboratory.
2. The following New courses are included to meet the industrial expectations.

New courses

1. Programming in C
2. Programming in C Lab
3. Computer Fundamentals Lab
4. Data Structures Lab
5. Object oriented programming Lab
6. Tamil-III/Foundational Tamil-III
7. English – III
8. Algorithms Lab
9. Auxiliary Physics Lab
10. Dreamweaver(Minor Course)
11. Tamil-IV/Foundational Tamil-IV
12. English-IV
13. Programming in Java Lab
14. DBMS Lab
15. Online Content creation
16. Fundamentals of R Programming
17. MATLAB Programming Lab(Elective)
18. R Programming Lab(Elective)
19. Python Programming Lab(Elective)
20. .NET Lab (Elective)
21. GIMP (GNU Image Manipulation Program) Lab (Elective)
22. Theory of Computation Lab (Elective)
23. Introduction to Machine Learning
24. Web Technologies Lab(Elective)
25. Mobile Application Development Lab(Elective)
26. Cloud Computing Lab (Elective)

3. **Course Removed:**

1. Programming Methodologies
2. Digital Electronics
3. Angular JS (Minor Course)

4. **Courses Moved:**

S.No.	Course Name	Previous Regulation	Regulation 2023
01	Object oriented Programming	III Semester	Moved to II Semester
02	Programming in Java	V Semester	Moved to IV Semester

II. COURSES ON EMPLOYABILITY/ENTREPRENEURSHIP/SKILL DEVELOPMENT

The curriculum focuses 87.5 % of the courses with either/and employability/entrepreneurship/skill development. The courses are given below

Table: Categorization of courses

S.No.	Semester	Category	Code	Subject Name	Category
1.	I	AECC 1	XGT101/ XFT101	Tamil –I/ Foundational Tamil - I	*****
2.	I	AECC 2	XGE102	English– I	*****
3.	I	CC-1A	XBC103	Programming in C	Skill Development
4.	I	CC-1B	XBC104	Algebra, Calculus & Analytical Geometry	Skill Development
5.	I	CC-1C	XBC105	Computer Fundamentals	Skill Development
6.	I	CC-1A-Lab	XBC106	Programming in C Lab	Skill Development
7.	I	CC-1C Lab	XBC107	Computer Fundamentals Lab	Skill Development
8.	I	UMAN-1	XUMA001	Human Ethics, Values, Rights, and Gender Equality	Skill Development
9.	II	AECC 3	XGT201/ XFT201	Tamil – II/ Foundational Tamil - II	*****
10.	II	AECC 4	XGE202	English - II	*****
11.	II	CC- 2A	XBC203	Data Structures	Skill Development
12.	II	CC- 2B	XBC204	Discrete Mathematics	Skill Development
13.	II	CC- 2C	XBC205	Object oriented programming	Employability
14.	II	CC-2A Lab	XBC206	Data Structures Lab	Employability
15.	II	CC- 2C Lab	XBC207	Object oriented programming Lab	Employability
16.	II	UMAN-2	XUMA002	Environmental Studies	*****
17.	III	AECC 5	XGT301/ XFT301	Tamil – III/ Foundational Tamil - III	*****
18.	III	AECC 6	XGE302	English– III	*****
19.	III	SEC-1B	XBC303	Multimedia Systems	Skill Development
20.	III	CC-3A	XBC304	Operating System	Skill Development
21.	III	CC-3B	XBC305	Algorithms	Employability
22.	III	CC-3C	XBC306	Auxiliary Physics	*****
23.	III	GE-1		*Open Elective - To be chosen by student	*****
24.	III	CC-3B Lab	XBC307	Algorithms Lab	Employability
25.	III	CC-3C Lab	XBC308	Auxiliary Physics Lab	*****
26.	III	UMAN	XUMA003	Disaster Management	*****

57.	V		XBC506C	Theory of Computation Lab	Skill Development
58.	V	UMAN5	XUMA005	Cyber Security	Employability
59.	V		XBC507	IPT 21 Days	Skill Development
60.	VI	SEC-4A	XBC601A	Web Technologies	Employability
61.	VI		XBC601B	Mobile Application Development	Employability
62.	VI		XBC601C	Cloud Computing	Employability
63.	VI	DSE-2A	XBC602A	Internet of Things	Employability
64.	VI		XBC602B	Data Mining	Employability
65.	VI		XBC602C	Artificial Intelligence	Employability
66.	VI		XBC602D	Computer Graphics	Employability
67.	VI	DSE–2B	XBC603A	Introduction to Machine Learning	Employability
68.	VI		XBC603B	Human Computer Interface	Skill Development
69.	VI		XBC603C	Data Analytics	Employability
70.	VI	SEC-4A Lab	XBC604A	Web Technologies Lab	Employability
71.	VI		XBC604B	Mobile Application Development Lab	Employability
72.	VI		XBC604C	Cloud Computing Lab	Employability
73.	VI	DSE-2C	XBC605	Project Work	Employability

The BoS members recommended submitting the outcome of this meeting in the forthcoming Academic council meeting for approval.

Dr.D.MAGHESH KUMAR.M.Sc.,M.E.,Ph.D.,
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Periyar Maniammai Institute of
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Periyar Nagar, Vallam, Thanjavur -613 403.

2. Extracts of the Minutes of 42th ACM Meeting conducted on 08.07.2023 – B.Sc Computer Science

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MINUTES OF FORTY SECOND MEETING OF THE ACADEMIC COUNCIL

Date : 08.07.2023 **Venue: Richard Dawkins Hall**
Time : 10.30 A.M **Place : PMIST, Vallam – Thanjavur**

The Forty Second Meeting of the Academic Council of the Periyar Maniammai Institute of Science & Technology (PMIST), Vallam, Thanjavur held on 08.07.2023 at 10.30 a.m.

Prof.S.Velusami, Hon'ble Vice-Chancellor, chaired the meeting.

The following Academic Council Members were present

1.	Dr.D.Aarthi Saravanan	Member
2.	Dr.A.Anand Jerard Sebastine	Member
3.	Dr.S.Arumugam	Member
4.	Dr.A.P.Aruna	Member
5.	Dr.P.Aruna	Member
6.	Dr.S.Asokan	Member
7.	Dr.P.Balakumar	Member
8.	Dr.S.Buvaneswari	Member
9.	Dr.P.Guru	Member
10.	Dr.K.Geetha	Member
11.	Dr.A.George	Member
12.	Dr.A.Manohar (Represented for Dr.S.Gomathi)	Member
13.	Dr.V.Hamsadhwani	Member
14.	Dr.R.Jayanthi	Member
15.	Dr.N.Jayanthi	Member
16.	Dr.J.Jeyachidra	Member
17.	Dr.D.Jeyasimman	Member
18.	Mr.I.Karthic Subramaniayan	Member
19.	Dr.R.Kathiravan	Member

DEPARTMENT OF SOFTWARE ENGINEERING

FCSE Soft. Engg. B.Sc.-CS 42.4.6

TO CONSIDER AND APPROVE the Curriculum and Syllabi for B.Sc. – Computer Science programme under Full-Time (Regulation 2023).

Notes:

The Board of Studies of the Department of Software Engineering recommended the Curriculum from I to VI Semesters and Syllabi from I to VI Semesters for B.Sc. – Computer Science programme under Full-Time (Regulation 2020 Revision 2).

Based on UGC - Learning Outcomes based Curriculum Framework (LOCF) the modifications in the curriculum are made.

Curriculum and Syllabi is in line with UGC proposed guidelines 2020 with 50 % revision from previous syllabus. The syllabus revision included feedback on curricular aspects from students, teachers, employers and alumni. The syllabus has 87.5% courses having focus on employability / entrepreneurship / Soft Skill/Skill development.

The new courses and Value added courses (Regulation 2020 Revision 2) to be offered by department are:

(Note: Theory cum Lab courses are separated into Theory and Lab courses)

New courses

1. Programming in C
2. Programming in C Lab
3. Computer Fundamentals Lab
4. Data Structures Lab
5. Object oriented programming Lab
6. Tamil-III/Foundational Tamil-III
7. English – III
8. Algorithms Lab
9. Auxiliary Physics Lab
10. Dreamweaver(Minor Course)
11. Tamil-IV/Foundational Tamil-IV
12. English-IV
13. Programming in Java Lab
14. DBMS Lab
15. Online Content creation
16. Fundamentals of R Programming
17. MATLAB Programming Lab(Elective)
18. R Programming Lab(Elective)
19. Python Programming Lab(Elective)
20. .NET Lab (Elective)
21. GIMP (GNU Image Manipulation Program) Lab (Elective)
22. Theory of Computation Lab (Elective)
23. Introduction to Machine Learning
24. Web Technologies Lab(Elective)
25. Mobile Application Development Lab(Elective)
26. Cloud Computing Lab (Elective)

Courses Moved:

Sl.No	Course Name	Previous Regulation	Regulation 2023
01	Object oriented Programming	III Semester	Moved to II Semester
02	Programming in Java	V Semester	Moved to IV Semester

Value Added Courses

1. Computer Hardware
2. Problem Solving Techniques
3. Enhancing Skills in Excel
4. Practical Computer networking
5. Data Science
6. UI Design

3. Curriculum and Syllabus of the programme – Before Revision

PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

(Under Section 3 of UGC Act, 1956)

Faculty of Computing Sciences and Engineering

Department of Software Engineering

CURRICULUM for B. Sc (Computer Science)
REGULATIONS – 2020 Rev1
(Applicable to the students admitted from the Academic year 2022-23)

I SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 1	XGT101/ XFT101	Tamil –I/ Foundational Tamil – I	2	1	0	0	**3**	2	1	0	0	3
AECC 2	XGE102	English – I	2	1	0	0	**3**	2	1	0	0	3
CC-1A	XBC103	Programming Methodologies	3	1	1	1	**6**	3	1	3	1	7 + 1
CC-1B	XBC104	Algebra, Calculus & Analytical Geometry	4	1	0	0	5	4	1	0	0	5
CC-1C	XBC105	Computer Fundamentals	3	1	1	1	**6**	3	1	3	**1**	7 + 1
UMAN-1	XUMA001	Human Ethics, Values, Rights, and Gender Equality	1	0	0	0	**1**	1	0	0	1	2
Extension Activities (NSS,NCC,NSO,RRC and SwachhBharath)											1	1
Mentor Hour												1
Library Hour												1
		Total	**15**	**5**	**2**	**2**	**24**	**14**	**5**	**6**	**3**	**30**

II SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 3	XGT201/ XFT201	Tamil – II/ Foundational Tamil – II	2	1	0	0	**3**	2	1	0	0	3
AECC 4	XGE202	English – II	2	1	0	0	**3**	2	1	0	0	3
CC- 2A	XBC203	Data Structures	3	1	1	1	**6**	3	1	3	1	7+1
CC- 2B	XBC204	Discrete Mathematics	3	1	0	0	**4**	3	1	0	0	4
CC- 2C	XBC205	Digital Electronics	3	1	1	1	**6**	3	1	3	1	7+1
UMAN-2	XUMA002	Environmental Studies	1	0	0	0	**1**	1	0	0	1	2
Extension Activities (NSS,NCC,NSO,RRC and SwachhBharath)											2	2
Mentor Hour												1
Library Hour												1
		Total	**14**	**5**	**2**	**2**	**23**	**14**	**5**	**6**	**3**	**30**

III SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
SEC-1B	XBC301	Multimedia Systems	2	0	0	1	3	2	0	0	1	2+1
CC-3A	XBC302	Operating System	3	1	0	1	5	3	1	0	1	4+1
CC-3B	XBC303	Algorithms	3	1	1	1	6	**3**	1	3	1	7+1
CC-3C	XBC304	Auxillary Physics	3	1	1	0	5	**3**	1	3	0	7
GE-1		*Open Elective - To be chosen by student	3	0	0	0	3	**3**	0	0	0	3
	XUMA003	Disaster Management	1	0	0	0	**1**	1	0	0	1	2
Minor Course	XBC307	R Programming * Extra Credit	1	0	0	0	1*	**1**	0	0	0	1
Extension Activities (NSS,NCC,NSO,RRC and SwachhBharath)											2	2
Mentor Hour												1
Library Hour												1

		Total	**15+ 1***	**3**	**2**	**3**	**23+ 1***	**19**	**3**	**5**	**3**	**30**

IV SEMESTER

Category	**Course Code**	**Course Name**	**Credits**					**Hours**				
			L	**T**	**P**	**SS**	**Total**	**L**	**T**	**P**	**SS**	**Total**
SEC-2B	XBC401	Object Oriented Programming	2	0	1	0	**3**	2	0	3	0	5
CC - 4A	XBC402	Database Management Systems	3	1	1	1	**6**	3	1	3	0	7
CC - 4B	XBC403	Statistics	3	1	0	1	**5**	3	1	0	1	4+1
CC - 4C	XBC404	Principles of Management	3	1	0	0	**4**	3	1	0	0	4
GE-2		*Open Elective - To be chosen by student	3	0	0	0	**3**	3	0	0	0	3
	XUMA 004	Introduction to Entrepreneurship Development	1	0	0	0	**1**	1	0	0	1	2
Minor Course	XBC407	Angular JS *Extra Credit	1*	0	0	0	**1***	1	0	0	0	1
Extension Activities (NSS,NCC,NSO,RRC and SwachhBharath)											2	2
Mentor Hour												1
Library Hour												1
		Total	**15+ 1***	**3**	**2**	**2**	**22+1***	**14+ 1**	**3**	**5**	**1**	**30**

V SEMESTER

Category	**Course Code**	**Course Name**	**Credits**					**Hours**				
			L	**T**	**P**	**SS**	**Total**	**L**	**T**	**P**	**SS**	**Total**
SEC-3A	XBC501 A	MATLAB Programming	2	1	1	0	**4**	2	1	3	0	6
	XBC501 B	Programming in Java										
	XBC501 C	Python Programming										
DSE-1A	XBC502 A	Software Engineering	3	1	0	1	**5**	3	1	0	1	4+1
	XBC502 B	Computer Ethics										
	XBC502 C	Computer Organization &										

		Architecture										
	XBC502D	Computer Networks										
DSE-1B	XBC503A	.NET Technologies	3	1	1	0	**5**	3	1	3	0	7
	XBC503B	GIMP(GNU Image Manipulation Program)										
	XBC503C	Theory of Computation										
DSE-1C	XBC504A	Image Processing	3	1	0	1	**5**	3	1	0	1	4+1
	XBC504B	Internet Technologies										
	XBC504C	System Security										
GE-3		*Open Elective - To be chosen by student	3	0	0	0	**3**	3	0	0	0	3
UMAN5	XUMA005	Cyber Security	1	0	0	0	**1**	1	0	0	1	2
Extension Activities (NSS,NCC,NSO,RRC and SwachhBharath)											2	2
Mentor Hour												1
Library Hour												1
	XBC505	IPT 21 Days	0	0	0	0	**2**	0	0	0	0	0
			15	**4**	**2**	**2**	**25**	**15**	**4**	**6**	**5**	**30**

VI SEMESTER

Category	**Course Code**	**Course Name**	**Credits**					**Hours**				
			L	**T**	**P**	**SS**	**Total**	**L**	**T**	**P**	**SS**	**Total**
SEC-4A	XBC601A	Web Technologies	3	0	1	1	**5**	3	0	3	1	6+1
	XBC601B	Mobile Application Development										
	XBC601C	Cloud Computing										
DSE-2A	XBC602A	Internet ofThings	3	1	0	1	**5**	3	1	0	1	**4+1**
	XBC602B	Data Mining										
	XBC602C	Artificial Intelligence										
	XBC602D	Computer Graphics										
DSE–2B	XBC603A	Machine Learning	3	1	0	1	**5**	3	1	0	0	**4+1**
	XBC603B	Human Computer Interface										

	XBC603C	Data Analytics										
DSE-2C	XBC604	Project Work	0	0	6	0	**6**	**0**	**0**	**12**	**0**	**12**
Extension Activities (NSS,NCC,NSO,RRC											2	**2**
Mentor Hour												**1**
Library Hour												**1**
			9	**2**	**7**	**3**	**21**	**9**	**2**	**15**	**4**	**30**

Total Credits : 140

Elective I:

Subject Code	Subject Name	L	T	P	SS	H
XBC501A	MATLAB Programming	2	1	1	0	4
XBC501B	Programming in Java	2	1	1	0	4
XBC501C	Python Programming	2	1	1	0	4

Elective II:

Subject Code	Subject Name	L	T	P	SS	H
XBC502A	Software Engineering	3	1	0	1	5
XBC502B	Computer Ethics	3	1	0	1	5
XBC502C	Computer Organization & Architecture	3	1	0	1	5

Elective III:

Subject Code	Subject Name	L	T	P	SS	H
XBC503A	.NET Technologies	3	1	0	1	5
XBC503B	GIMP(GNU Image Manipulation Program)	3	1	0	1	5
XBC503C	Theory of Computation	3	1	0	1	5

Elective IV:

Subject Code	Subject Name	L	T	P	SS	H
XBC504A	Image Processing	3	1	0	1	5
XBC504B	Internet Technologies	3	1	0	1	5
XBC504C	System Security	3	1	0	1	5

Elective V:

Subject Code	Subject Name	L	T	P	SS	H
XBC601A	Web Technologies	3	0	1	1	5
XBC601B	Mobile Application Development	3	0	1	4	5
XBC601C	Cloud Computing					

Elective VI:

Subject Code	Subject Name	L	T	P	SS	H
XBC602A	Internet of Things	3	1	0	1	5
XBC602B	Data Mining	3	1	0	1	5
XBC602C	Artificial Intelligence	3	1	0	1	5

Elective VI:

Subject Code	Subject Name	L	T	P	SS	H
XBC603A	Machine Learning	3	1	0	1	5
XBC603B	Human Computer Interface	3	1	0	1	5
XBC603C	Data Analytics	3	1	0	1	5

NOTE:

AECC – Ability **E**nhancement **C**ompulsory **C**ourse

DSC– Department **S**pecific **C**ourse

DSE – Discipline **S**pecific **E**lective

GE – Generic **E**lective

SEC – Skill **E**nhancement **C**ourse

CC – **C**ore **C**ourse

UMAN – University **MAN**datory

L - Lecture **T- Tutorial** **P – Practical** **C-Credit**

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

Category	I	II	III	IV	V	VI	Total

AECC	**6**	6					**12**
CC	**17**	**16**	**16**	**15**			**64**
SEC			**3**	**3**	**4**	**5**	**15**
DSE					**15**	**16**	**31**
GE			**3**	**3**	**3**		**9**
IPT					**2**		**2**
Minor Course			**1**	**1**			**2**
Mandatory Course	1	1	**1**	1	1		**5**
Total	**24**	**23**	**24**	**23**	**25**	**21**	**140**

Total Credits	**AECC(%)**	**CC(%)**	**SEC(%)**	**DSE(%)**	**GE(%)**	**MINOR(%)**	**IPT(%)**	**UMAN (%)**
140	8.69	46.37	8.69	22.46	6.52	1.44	1.44	3.62

SYLLABUS – B.SC. COMPUTER SCIENCE

Course Code		L	T	P	C
Course Name	**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	*Recognize* (அடையாளம் காணுதல்) பல்வேறு அறிஞர் பெருமக்களின் தொண்டுகளைத் தமிழ்மொழி மூலம் அறிந்து கொள்ளல்.	Cognitive	Remember
CO2	*Choose* (தெரிவு செய்தல்) பன்முகப் பரிமாணங்களின் கவிதைகளை இலக்கியங்கள் மூலம் அறிந்து கொள்ளல்.	Cognitive	Remember
CO3	*Describe* (விளக்குதல்) தமிழ் மகளிரின் உரையாடல் சிறப்புச் செய்திகளை உணர்தல்.	Cognitive	Understand
CO4	*Apply* (விளக்குதல்) பல்வேறு கலைத்துறைச் சார்ந்த பிரிவுகள், மண்ணின் பாடல்கள் குறித்துத் தெளிவு பெறல்.	Cognitive	Apply
CO5	*Analyze* (பகுத்தல்) சிறுகதைகளின் தோற்றம் மற்றும் வளர்ச்சி நிலை நாடகங்கள் - கவிதை குறித்துத் தெளிவு பெறுதல்.	Cognitive	Analyze

அலகு-1	**தமிழ் அறிஞர்களும் தமிழ்த்தொண்டும்**	9
பாரதியார், பாரதிதாசன், நாமக்கல் கவிஞர், சி.இலக்குவனார், உ.வே.சாமிநாத அய்யர், தெ.பொ.மீனாட்சி சுந்தரம், கவிமணி தேசியவிநாயகம் பிள்ளை தொடர்பான செய்திகள், சிறந்த தொடர்கள், சிறப்புப் பெயர்கள்.		
அலகு-2	**கவிதைகள் (மரபுக்கவிதை, புதுக்கவிதை)**	9
மரபுக்கவிதை : முடியரசன், வாணிதாசன், சுரதா, கண்ணதாசன், உடுமலை நாராயண கவி, பட்டுக்கோட்டை கல்யாண சுந்தரம், மருதகாசி தொடர்பான செய்திகள். புதுக்கவிதை : ந.பிச்சமூர்த்தி, சி.சு.செல்லப்பா, மு.மேத்தா, ஈரோடு தமிழன்பன், அப்துல் ரகுமான், ஞானக்கூத்தன், ஆலந்தூர் மோகனரங்கன் தொடர்பான செய்திகள்.		
அலகு-3	**உரையாடல்கள், தமிழ் மகளிரின் சிறப்பு**	9
ஜி.யு.போப் மற்றும் வீரமாமுனிவரின் தமிழ்ப்பணி, பெரியார், அண்ணா, முத்துராமலிங்கத்தேவர், அம்பேத்கர், காமராசர், மா.பொ.சிவஞானம், காயிதே மில்லத் சமுதாயத் தொண்டு. அன்னி பெசண்ட் அம்மையார், மூவாலூர் ராமாமிர்தம்மாள், டாக்டர் முத்துலட்சுமி ரெட்டி, வேலுநாச்சியார், வள்ளியம்மை, ராணி மங்கம்மாள் சிறப்பு.		
அலகு-4	**நாட்டுப்புறப்பாடல்**	9
தாலாட்டுப்பாடல், தொழில் பாடல், ஒப்பாரிப் பாடல்.		
அலகு-5	**இலக்கிய வரலாறு**	9
உரைநடை, சிறுகதை, நாடகம், கவிதைகள்.		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	—	—	45

பாட நூல்கள்:

1. முனைவர் கா.செல்வகுமார் (தொ.ஆ.), பொதுத்தமிழ், மார்ச் - 2022, துரைகோ பதிப்பகம், அரும்பாக்கம், சென்னை – 106. 9884159972.
2. முனைவர் மு.அருணாசலம் (ப.ஆ.) – தமிழ் இலக்கிய வரலாறு – 2012, அருண் பதிப்பகம், தரைத்தளம், பாலாஜி நகர், ளுடீஜ காலனி, கண்டோன்மெண்ட், திருச்சி - 1. 9894440530
3. சு.சக்திவேல் - நாட்டுப்புற இயல் ஆய்வு, மணிவாசகர் பதிப்பகம் - 12, மேலசன்னதி வீதி, சிதம்பரம் - 1.
4. முனைவர் கோ.பெரியண்ணன் - அடிப்படை எளிய தமிழ் இலக்கணம் - 2003 –வனிதா பதிப்பகம், 11- நானா தெரு, பாண்டி பஜார், தி.நகர், சென்னை - 17.

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.

பார்வை நூல்கள்:

1. முனைவர் ந.லெனின், தாலாட்டுப் பாடல், பிப்ரவரி - 2015, பிருந்தா பதிப்பகம், தஞ்சாவூர் - 5.
2. கோ. வெங்கடாசலம் (தொ.ஆ.) - 2005, தமிழ் இலக்கிய கைவிளக்கு, அன்னை சரஸ்வதி பதிப்பகம், குடியாத்தம்.
3. முனைவர் இராஜா வரதராஜா - பயன்முறைத் தமிழ் - ஜூன் 2015, சிவகுரு பதிப்பகம், 7.̓.40, கிழக்குச் செட்டித்தெரு, பரங்கிமலை, சென்னை – 16.

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	PO 2	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

Performance Indicators

PI 8: 1 High Ethical Standards

1.1.1 Practice ethical codes and standards endorsed by professional engineers.

PI 9: 1 Leadership and team work

1.1.1 Perform as an individual and as a leader in diverse teams and in multi-disciplinary scenarios.

PI 10: 1Communication Skills

1.1.1 Professional communication with the society to comprehend and formulate reports, documentation, effective delivery of presentation and responsible to clear instructions.

PI 1 1: 1. Life-long learners:

1.1.1 Update the technical needs in a challenging world in equipping themselves to maintain their competence

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 ANDSEARCHING 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.

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

http://www.comptechdoc.org/basic/basictut/index.html
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	0	5
C	**P**	**A**		L	T	P	SS	H
4	0	0		4	1	0	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

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.

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

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Advanced Engineering Mathematics, Prof. Pratima Panigrahi, 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	**XUMA001**	**L**	**T**	**P**	**SS**	**C**
COURSE NAME	**HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY**	**1**	**0**	**0**	**0**	**1**
PREREQUISITES	**-**	**L**	**T**	**P**	**SS**	**H**
C:P:A	**1.5:0:0.5**	**1**	**0**	**0**	**1**	**2**

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 II GENDER 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).

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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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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 relat

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

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	8

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 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	Cognitive	Create

	etc.		
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/

XBC204			**DISCRETE MATHEMATICS**	**L**	**T**	**P**	**SS**	**C**
				3	1	0	0	4
C:P:A			**NIL**	**L**	**T**	**P**	**SS**	**H**
3	0	0		3	1	0	0	**4**

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 semi group 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 8085 microprocessor for its various applications and ***Understand*** 8085 instruction set and develop simple programme 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.

E-References:

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

<table>
<tr><td colspan="3">XUMA002</td><td rowspan="3">ENVIRONMENTAL STUDIES</td><td>L</td><td>T</td><td>P</td><td>SS</td><td>C</td></tr>
<tr><td colspan="3"></td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>C</td><td>P</td><td>A</td><td>L</td><td>T</td><td>P</td><td>SS</td><td>H</td></tr>
<tr><td>1.5</td><td>0</td><td>0.5</td><td>1</td><td>0</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td colspan="9">PREREQUISITE :Nil</td></tr>
<tr><td colspan="2">Course Outcomes</td><td colspan="4">Domain</td><td colspan="3">Level</td></tr>
<tr><td colspan="9">After the completion of the course, students will be able to</td></tr>
<tr><td>CO1</td><td colspan="3">Describe the significance of natural resources and explain anthropogenic impacts.</td><td colspan="2">Cognitive</td><td colspan="3">Remember
Understand</td></tr>
<tr><td>CO2</td><td colspan="3">Illustrate the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.</td><td colspan="2">Cognitive</td><td colspan="3">Understand</td></tr>
<tr><td>CO3</td><td colspan="3">Identify the facts, consequences, preventive measures of major pollutions and recognize the disaster phenomenon</td><td colspan="2">Cognitive
Affective</td><td colspan="3">Remember
Receiving</td></tr>
<tr><td>CO4</td><td colspan="3">Explain the socio-economic, policy dynamics and practice the control measures of global issues for sustainable development.</td><td colspan="2">Cognitive</td><td colspan="3">Understand</td></tr>
<tr><td>CO5</td><td colspan="3">the impact of population and the concept of various welfare programs, and apply the modern technology towards environmental protection.</td><td colspan="2">Cognitive</td><td colspan="3">Understand
Apply</td></tr>
<tr><td colspan="2">UNIT I</td><td colspan="5">INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY</td><td>6</td></tr>
<tr><td colspan="9">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</td></tr>
</table>

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.

E-references

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**

XBC301			**MULTIMEDIA SYSTEMS**	**L**	**T**	**P**	**ss**	**C**
				2	0	0	1	3
C	**P**	**A**		**L**	**T**	**P**	**ss**	**H**
3	**1**	**0**		2	0	0	1	3

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.

REFERNCES

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”, PearsonEducation, 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.

E-REFERENCES

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

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

E-References

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

REFERENCES:

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

E-REFERENCES:

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			AUXILLARY PHYSICS	L	T	P	SS	C
				3	1	1	0	5
C	P	A		L	T	P	SS	H
3	1	0		3	1	3	0	7

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:

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

REFERENCE BOOKS:

Basic Electronics – B.L. Theraja, S Chand & company Ltd, New Delhi.
Fundamentals of digital computers – Bartee, McGraw-Hill.
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

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**

XUMA003			**DISASTER MANAGEMENT**	**L**	**T**	**P**	**SS**	**C**
				1	**0**	**0**	**0**	**1**
C	P	A		**L**	**T**	**P**	**SS**	**H**
2.75	0	0.25		**1**	**0**	**0**	**0**	**1**

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	TOTAL
45	-	-	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.ini

Mapping of CO with GA

Course outcomes	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	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	**1**					**3**	**2**	**1**				**1**

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
				2	0	1	0	3
C	P	A		L	T	P	SS	H
2.5	1	0.5		2	0	3	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

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	0	7

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*** the Transaction 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
				3	1	0	1	5
C	P	A		L	T	P	SS	H
3.0	0.5	0.5		3	1	0	1	5

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 Understanding	Applying
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**
				3	1	0	0	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0.5**	**0.5**		3	1	0	0	**4**

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*** he 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

XUMA004			INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT	L	T	P	SS	C
				1	0	0	0	1
C	P	A		L	T	P	SS	H
2.5	0	0.5		1	0	0	1	2

PREREQUISITE :

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

CO1	***Recognize*** and ***describe*** the personal traits of an entrepreneur.	Affective Cognitive	Receiving Understand
CO2	***Determine*** the new venture ideas and ***analyze*** the feasibility report.	Cognitive	Understand Analyse
CO3	***Develop*** the business plan and ***analyze*** the plan as an individual or in team.	Affective Cognitive	Receiving Analyse
CO4	***Describe*** various parameters to be taken into consideration for launching and managing small business.	Cognitive	Understand
CO5	***Describe*** Technological management and Intellectual Property Rights	Cognitive	Understand

UNIT I	**ENTREPRENEURIAL TRAITS AND FUNCTIONS**	

Definition of Entrepreneurship; competencies and traits of an entrepreneur; factors affecting Entrepreneurship Development; Role of Family and Society ; Achievement Motivation; Entrepreneurship as a career and national development;

UNIT II	**NEW PRODUCT DEVELOPMENT AND VENTURE CREATION**	

Ideation to Concept development; Sources and Criteria for Selection of Product; market assessment ; Feasibility Report ;Project Profile; processes involved in starting a new venture; legal formalities; Ownership; Case Study.

UNIT III	**ENTREPRENEURIAL FINANCE**	

Financial forecasting for a new venture; Finance mobilization; Business plan preparation; Sources of Financing, Angel Investors and Venture Capital; Government support in startup promotion.

UNIT IV	**LAUNCHING OF SMALL BUSINESS AND ITS MANGEMENT**	

Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units.

UNIT V	**TECHNOLOGY MANAGEMENT, IPR PORTFOLIO FOR NEW PRODUCT VENTURE**	**9**

Technology management; Impact of technology on society and business; Role of Government in supporting Technology Development and IPR protection; Entrepreneurship Development Training and Other Support Services.

Lecture	Tutorial	Practical	Self Study	Total
15	**0**	**0**	**15**	**15 + 15**

TEXTBOOKS:

1. Hisrich, 2016, *Entrepreneurship*, Tata McGraw Hill, New Delhi.

2. S.S.Khanka, 2013, *Entrepreneurial Development*, S.Chand and Company Limited, New Delhi.

REFERENCES

1. Mathew Manimala, 2005, *Entrepreneurship Theory at the Crossroads, Paradigms & Praxis*,Biztrantra ,2nd Edition.
2. Prasanna Chandra, 2009, *Projects – Planning, Analysis, Selection, Implementation and Reviews*, Tata McGraw-Hill.
3. P.Saravanavel, 1997, *Entrepreneurial Development*, Ess Pee kay Publishing House, Chennai.
4. Arya Kumar,2012, *Entrepreneurship: Creating and Leading an Entrepreneurial Organisation*, Pearson Education India.
5. Donald F Kuratko, T.V Rao, 2012, *Entrepreneurship: A South Asian perspective*, Cengage Learning India.

E-REFERENCES

1. Dinesh Awasthi, Raman Jaggi, V.Padmanand, *Suggested Reading / Reference Material for Entrepreneurship Development Programmes* (EDP/WEDP/TEDP), EDI Publication, Entrepreneurship Development Institute of India, Ahmedabad. Available from: http://www.ediindia.org/doc/EDP-TEDP.pdf
2. Jeff Hawkins, " Characteristics of a successful entrepreneur", ALISON Online entrepreneurship courses, "https://alison.com/learn/entrepreneurial-skills
3. Jeff Cornwall, "Entrepreneurship -- From Idea to Launch", Udemy online Education, https://www.udemy.com/entrepreneurship-from-idea-to-launch/

XBC407			ANGULAR JS	L	T	P	S S	C
				1	0	0	0	1
C	P	A		L	T	P	S S	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

XBC501A	MATLAB PROGRAMMING	L	T	P	SS	C
		2	1	1	0	4

C	P	A		L	T	P	SS	H
3	0	0.5		2	1	3	0	6

Prerequisite: Computer Fundamentals

Course Outcome		Domain	Level
CO1	***Recognize*** the fundaments of procedural and functional programming.	Cognitive	Remember
CO2	***Express*** the functionalities of Matlab data types and structures	Cognitive	Understand
CO3	***Describe*** the concepts and guidelines of Be able to set up simple real-life numerical problems such that they can be solved and visualized using basic codes in Matlab.	Cognitive	Understand
CO4	Actively ***Participate*** in ***Choosing*** the appropriate techniques and methods for the real time applications as a team.	Affective Cognitive	Response Apply
CO5	***Analyze*** the techniques used in the various stages of Software Engineering.	Cognitive	Analyze

UNIT I **INTRODUCTION TO MATLAB** **9+6**

Introduction to MATLAB Programming- Basics of MATLAB programming, Array operations in MATLAB, Loops and execution control, working with files: Scripts and Functions, Plotting and program output.

Lab:

Explore MATLAB

Arithmetic Operations

Arrays

UNIT II	APPROXIMATIONS AND ERRORS	9+6

Approximations and Errors- Defining errors and precision in numerical methods, Truncation and round-off errors, Error propagation, Global and local truncation errors.

Lab:
Functions
Control flow
Plotting

UNIT III	LINEAR EQUATIONS	9+6

Linear Equations- Linear algebra in MATLAB, Gauss Elimination, LU decomposition and partial pivoting, Iterative methods: Gauss Siedel Method.

Lab:
Programming in MATLAB
Loading and saving data
Linear equations

UNIT IV	REGRESSION AND INTERPOLATION	9+6

Regression and Interpolation- Introduction, Linear least squares regression (including lsqcurvefit function), Functional and nonlinear regression (including lsqnonlin function), Interpolation in MATLAB using spline and pchip.

Lab:
Linear regression
Linear least squares regression

UNIT V	NON - LINEAR EQUATIONS	9+6

Nonlinear Equations- Nonlinear equations insingle variable, MATLABfunction fzero in single variable, Fixed-point iteration insingle variable, Newton- Raphson in single variable, MATLAB function fsolve in single and multiple variables, Newton-Raphson in multiple variables.

Lab:
Nonlinear Equations
Newton- Raphson in single variable

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
30	15	45	0	90

TEXT BOOKS:

1. Fausett L.V.(2007) Applied Numerical Analysis Using MATLAB, 2nd Ed., Pearson Education
2. Essential MATLAB for Engineers and Scientists, 6th Edition, Brian Hahn; Daniel T. Valentine, Academic Press, Web ISBN -13: 978-0-12-805271-6,

REFERENCES:

1. Roger. S. Pressman, Software Engineering A Practitioner's Approach, Sixth Edition, Tata McGraw Hill Higher Education, 2010.
2. Ian Sommerville, Software Engineering, Ninth Edition, Pearson Education Inc., 2012.

E-REFERENCES:

1. http://www.rspa.com/spi/
2. https://www.wiziq.com/tutorials/software-engineering
3. http://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm
4. https://www.tutorialspoint.com/software_engineering/software_engineering_tutorial.pdf

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	2	1	1	1	1	2
CO2	3	1	3	2	1	1	1	1	2
CO3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	1	1	1	2	2
CO5	2	2	2	2	2	1	1	2	1
Average	2	2	2	2	1	1	1	1	2

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

XBC501B			PROGRAMMING IN JAVA	L	T	P	ss	C
				2	1	1	0	4
C	P	A		L	T	P	ss	H
3.5	0.5	0		2	1	3	0	6

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*** the Transaction 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+6

Fundamentals of Object-Oriented Programming – Java Evolution – Overview of Java Language –

Constants, Variables and Data Types – Operators and Expressions – Decision Making and Branching – Decision Making and Looping

Lab

1. Simple Java Programs
2. Decision Making, Branching and Looping

UNIT II	**CLASSES, OBJECTS AND METHODS**	**9+6**

Introduction – Defining a Class – Adding Variables – Adding Methods – Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Finalizer Methods – Abstract Methods and Classes – Visibility Control

Lab

3. Constructors and Method Overloading
4. Inheritance and Method Overriding

UNIT III	**ARRAYS, INTERFACE AND PACKAGES**	**9+6**

Arrays - One-Dimensional Array – Creating an array – Two-Dimensional Array – Strings – Vectors – Wrapper Classes – Interfaces: Multiple Inheritance – Packages

Lab

5.Arrays and Strings
6. Interfaces and Packages

UNIT IV	**MULTITHREADED PROGRAMMING**	**9+6**

Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Synchronization – Implementing the 'Runnable' Interface – Managing Errors and Exceptions – Types of Errors – Exceptions – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions

Lab

7.Multi Threading
8. Exception Handling

UNIT V	**APPLET PROGRAMMING**	**9+6**

Introduction – Applet Life Cycle – Creating an Executable Applet – Designing a Web Page – Applet Tag – Adding Applet to HTML File – Running the Applet – Passing Parameters to Applets – Getting Input from the User - Abstract Windowing Toolkit

Lab

9. Applet Programming
10. Event Handling

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
30	**15**	**45**	**0**	**90**

REFERENCES:

1. Bruce Eckel, Thinking in Java (4th edition) Herbert Schildt,
2. Java: The Complete Reference (9th edition)
3. Y. Daniel Liang, Introduction to Java Programming (10th edition)
4. Paul Deitel, Harvey Deitel, Java: How To Program (10th edition)
5. Cay S. Horsttnann, Core Java Volume I –Fundamentals (10th edition)

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

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

XBC501C			PYTHON PROGRAMMING	L	T	P	SS	C
				2	1	1	0	4
C	P	A		L	T	P	SS	H
3.5	0.25	0.25		2	1	3	0	6

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, Tuple Assignment, Precedence of 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 and Methods; Advanced List Processing - List Comprehension; Illustrative Programs: Selection Sort, Insertion Sort, 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 and Writing 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
30	**15**	**45**	**0**	**90**

TEXTBOOKS:
1. Mark Lutz, Learning Python 2. Tony Gaddis, starting out with Python 3. Kenneth A. Lambert, Fundamentals of Python
REFERENCES:
1. 1.James Payne, Beginning Python using Python 2.6 and Python 3 2.

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

XBC502A			**SOFTWARE ENGINEERING**	**L**	**T**	**P**	**SS**	**C**
				3	1	**0**	1	5
C	P	A		**L**	**T**	**P**	**SS**	**H**
2.9	**0**	**0.1**		**2**	1	0	1	**5**
Prerequisite			Computer Fundamentals					

Course Outcome		Domain	Level
CO1	***Recognize*** the significance of entire Software Engineering process.	Cognitive	Remember
CO2	***Express*** the functionalities of Cost Estimation and Requirement Specification Techniques.	Cognitive	Understand
CO3	***Describe*** the concepts and guidelines of Software Design, Coding, Testing and Maintenance.	Cognitive	Understand

CO4	Actively ***Participate*** in ***Choosing*** the appropriate techniques and methods for the real time applications as a team.	Affective Cognitive	Response Apply
CO5	***Analyze*** the techniques used in the various stages of Software Engineering.	Cognitive	Analyze

UNIT I	INTRODUCTION AND PLANNING A SOFTWARE PROJECT	12+6

Introduction - Definitions – Size Factors – Quality and Productivity factors – Managerial Issues.Planning a Software Project – Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.

UNIT II	COST ESTIMATION AND REQUIREMENTS SPECIFICATION	12+6

Software Cost Estimation – Cost Factors – Cost Estimation Techniques – Staffing – Level Estimation – Estimating Software Maintenance Costs.Software Requirements Definition – Software Requirement Specification – Formal Specification Techniques – Language and Processors for Requirements.

UNIT III	SOFTWARE DESIGN	12+6

Software Design – Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real Time and Distributed System design – Test Plans – Milestones, Walkthroughs and Inspections – Design Guidelines.

UNIT IV	IMPLEMENTATION	12+6

Implementation Issues – Structured Coding Techniques – Coding Style – Standard and Guidelines – Documentation guidelines – Data Abstraction – Exception Handling – Concurrency Mechanisms.

UNIT V	TESTING AND MAINTENANCE	12+6

Verification and Validation Techniques – Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification.Software Maintenance – Enhancing Maintainability during Development – Managerial aspects – Configuration Management – Source Code Metrics – Other Maintenance Tools and Techniques.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
30	15	45	0	90

TEXT BOOKS:

Richard E.Fairley, Software Engineering Concepts, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.

REFERENCES:

3. Roger.S.Pressman, Software Engineering A Practitioner's Approach, Sixth Edition, Tata McGraw Hill Higher Education, 2010.
4. Ian Sommerville, Software Engineering, Ninth Edition, Pearson Education Inc., 2012.

WEBSITES:

5. http://www.rspa.com/spi/
6. https://www.wiziq.com/tutorials/software-engineering
7. http://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm
8. https://www.tutorialspoint.com/software_engineering/software_engineering_tutorial.pdf

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	2	1	1	1	1	2
CO2	3	1	3	2	1	1	1	1	2
CO3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	1	1	1	2	2
CO5	2	2	2	2	2	1	1	2	1
Average	2	2	2	2	1	1	1	1	2

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

XBC502B			COMPUTER ETHICS	L	T	P	SS	C
				3	1	0	1	5
C	P	A		L	T	P	SS	H
2.5	0.5	0		3	1	0	1	5

PREREQUISITE: XBC103

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

Course Outcome		Domain	Level
CO1	***State*** the basics of graphics and ***identify*** how they can be used in computer.	Cognitive	Knowledge, Analyze
CO2	***Recall*** and ***distinguish*** the various 2-D Geometrical transforms and their applications.	Cognitive	Knowledge, Comprehension
CO3	***Explain*** the basic elements of **3**-D Object representation, and ***identify*** various 3D transformation techniques	Cognitive	Comprehension, Analysis
CO4	***Know*** about visible surface detection methods	Cognitive	Knowledge
CO5	***Construct*** various computer animation methods and ***choose***animation for an application.	Psychomotor	Perception, Set

UNIT - I	Introduction	12+6

The Need for Computer Ethics Training and Historical Milestones.

UNIT - II	Computer Ethics	12+6

Defining the Field of Computer Ethics, Computer ethics codes, Sample Topics in Computer Ethics i.Computer crime and computer security ii. Software theft and intellectual property rights iii. Computer hacking and the creation of viruses iv. Computer and information system failure v.Invasion of privacy. Privacy in the Workplace and on the Internet vi.Social implications of artificial intelligence and expert systems vii. The information technology salesman issues.

UNIT - III	Transparency	12+6

Transparency and Virtual Ethics, Free Speech, Democracy, Information Access.		
UNIT - IV	**Developing the Ethical Analysis**	**12+6**
Developing the Ethical Analysis Skills and Professional Values, Privacy, Accountability, Government Surveillance.		
UNIT - V	**Boundaries of Trust**	**12+6**
Boundaries of Trust, Trust Management, Wikipedia, Virtual Trust, Plagiarism in Online Environment, Intellectual Property, Net neutrality		

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
30	15	45	0	90

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.
2. "Computer Graphics Second edition", Zhigandxiang, Roy Plastock, Schaum's outlines, Tata McGraw hill edition.

REFERENCE BOOKS:

1. Deborah, J, Nissenbaun, H, Computing, Ethics & Social Values, Englewod Cliffs, New Jersey, Prentice Hall, 1995.
2. Spinello, R, Tavani, H, T, Readings in Cyberethics, Sudbury, MA, Jones and Bartlett Publishers, 2001.
3. Bynum,T, W; Rogerson, S, Computer Ethics and Professional Responsibility, Blackwell, 2004

XBC502C			COMPUTER ORGANIZATION & ARCHITECTURE	L	T	P	SS	C
				3	1	0	1	5
C	P	A		L	T	P	SS	H
3	0	0		3	1	0	1	5

PREREQUISITE: Digital Principles

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the operation of functional units of a computer	Cognitive Psychomotor	Knowledge
CO2	***Describe*** the computational operation of hardware units associated with a computing device.	Cognitive	Comprehension
CO3	***Demonstrate*** the operation of processing unit.	Cognitive Psychomotor	Application

CO4	***Compare*** the performance of different types of memory	Cognitive	Analyze
CO5	***Recognize*** the operation of interfacing devices.	Cognitive	Knowledge

UNIT I	**BASIC STRUCTURE OF COMPUTERS**	**12+6**

Functional Units - Bus Structures - Performance - Evolution - Machine Instructions and programs - Memory operations - Instruction and instruction sequencing - addressing modes - Basic I/O operations - stacks and queues - subroutines - Encoding of Machine instructions.

UNIT II	**ARITHMETIC UNIT**	**12+6**

Arithmetic - Design of fast adders - Binary Multiplication - Division - Floating point numbers and operations.

UNIT III	**BASIC PROCESSING UNIT**	**12+6**

Processing unit - Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control – Micro programmed control - pipelining - Basic concepts - Hazards - Inference on instruction sets. Data path and control considerations - Performance issues.

UNIT IV	**MEMORY SYSTEM**	**12+6**

RAM and ROM - Cache memories - Performance considerations - Virtual memories – secondary storage devices - Associative memories.

UNIT V	**INPUT / OUTPUT ORGANIZATION**	**12+6**

Accessing I/O devices - Interrupts - DMA - Buses - Interface circuits - standard I/O Interfaces. Case study of one RISC and one CISC processor.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
30	**15**	**45**	**0**	**90**

TEXT BOOKS

1. Carl Hamacher, ZvonkoUranesic, SafvatZaby., 2002. “Computer Organisation”, 5th edition, McGraw Hill.
2. John P Hayes, “Computer Architecture and Organisation”, 3rd edition, McGraw Hill .

REFERENCES

1. David A Patterson and John L. Hennessy, 2002. “ Computer Organization and Design The Hardware / Software Interface”, 2nd edition, Harcourt Asia, Morgan Kaufmann.

E-REFERENCE

1. www.**tutorials**point.com/**computer**_logical_**organization**/
2. **nptel**.ac.in/courses/106106092/

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 relation

XBC502D			**COMPUTER NETWORKS**	**L**	**T**	**P**	**C**
				3	**1**	**0**	**5**
C	**P**	**A**		**L**	**T**	**P**	**H**
2.8	**0**	**0.2**		**3**	**1**	**0**	**5**

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*** the protocol 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**
30	**15**	**45**	**0**	**90**

TEXT BOOKS:

1. Behrouz A.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**	**S S**	**C**
				3	**1**	**1**	**0**	**5**
C	**P**	**A**		**L**	**T**	**P**	**S S**	**H**
2.8	**1**	**0.2**		**3**	**1**	**3**	**0**	**7**

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**
30	**15**	**45**	**0**	**90**

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

Herbert Schildt, "C# 4.0 The Complete Reference", McGraw-Hill Education, 2010.

Marino Posadas, "Mastering C# and .NET Framework", Packt Publishing, 2016.

Paul Deitel and Harvey Deitel, "Visual C# How to Program", Prentice Hall; Pearson Education Limited; 6th edition (2017).

E-REFERENCES

www.tutorialspoint.com

4. 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

XBC503B			GIMP(GNU IMAGE MANIPULATION PROGRAM)	L	T	P	SS	C
				3	1	1	0	5
C	P	A		L	T	P	SS	H
2.5	0.5	0		3	1	3	0	7

PREREQUISITE: Basics of colors

Course Outcomes		Domain	Level
CO1	***Recognize*** the importance of Imaging Concepts and Graphic Formats.	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the functionalities of each Capturing and Creating Images.	Cognitive	Understand
CO3	***Employ*** the understanding of the various Grid Properties.	Cognitive	Apply
CO4	***Utilize*** the Image Manipulations.	Cognitive	Apply
CO5	***Design*** and ***Establish*** the Creating and Drawing tools.	Cognitive Psychomotor	Create Set

UNIT I	9+6+9
Imaging Concepts and Graphic Formats: Pixel, Resolution, File Size, Image Compression, Raster & Vector Images, Color Model.	
UNIT II	**9+6+9**
Capturing and Creating Images: Saving Images, Scanning Images, Familiarization with GIMP Interface.	
UNIT III	**9+6+9**
Settings: Foreground and Background Colors, Grid Properties.	
UNIT IV	**9+6+9**
Image Manipulations: Resizing images, cropping images, Moving and Copying images, Rotating and flipping images.	
UNIT V	**9+6+9**
Working with Text: Creating and editing text, Formatting Text, Applying text wraps. Tools: Drawing tools, Painting tools	

LECTURE	TUTORIAL	PRACTICAL	SELF - STUDY	TOTAL
30	15	45	0	90

REFERENCES:

1. Kay Richter, GIMP 2.8 - Buch (e-book)
2. Olivier Lecarme and KarineDelvare, The Book of GIMP, A complete Guide to Nearly Everything, Kindle Edition

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	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
Averge	2	3	3	3	3	1	1	3	2

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

XBC503C			THEORY OF COMPUTATION	L	T	P	SS	C
				3	1	1	0	5
C	P	A		L	T	P	SS	C
2.5	0.5	0		3	1	3	0	7

PREREQUISITE: XBC103, XBC301

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		9+3+9

Automata: Introduction to Formal Proof, Additional Forms of Proof, InductiveProofs, FiniteAutomata (FA), Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Finite Automata with Epsilon Transitions.

Lab:

Language of Binary strings which ends with the pattern 101.

UNIT II		9+3+9

Regular Expressions and Languages: Regular Expression, FA and Regular Expressions, Proving Languages not to be Regular, Closure Properties of Regular Languages, Equivalence and Minimization of Automata.

Lab:

Language of Binary strings such that the third symbol from the end is a Zero.		
UNIT III		**9+3+9**
Context Free Grammars and Languages: Context Free Grammar (CFG), Parse Trees, Ambiguity in Grammars and Languages, Definition of The Pushdown Automata, Languages of a Pushdown Automata, Equivalence of Pushdown Automata and CFG Deterministic Pushdown Automata. **Lab:** Language of parenthesized expressions with matching left and right parenthesis.		
UNIT IV		**9+3+9**
Properties of Context Free Languages: Normal Forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, Programming Techniques for TM, Variations of TM, Non-Universal TM, Universal TM. **Lab:** Language of Binary strings with equal number of Zeros and Ones.		
UNIT V		**9+3+9**
Undecidability: A Language that is not Recursively Enumerable (RE), an Undecidable Problem that is RE, Undecidable Problems about Turing Machine, Post's Correspondence Problem, The Classes P and NP. **Lab:** Language generated by the grammar {a n bn cn | n^3 1} Language { ap | p is prime}		

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
30	15	45	0	90

TEXT BOOKS:

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.
2. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.

Table 1: Mapping of COs with Pos

Course Outcomes	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	0	1	1	0	1	0	1	2
CO2	2	2	2	1	1	0	1	2	3
CO3	1	2	2	1	2	1	1	2	3
CO4	0	1	2	2	2	1	0	2	3
CO5	1	2	3	2	3	2	1	3	3
Average	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**3**

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

XBC504A			IMAGE PROCESSING	L	T	P	SS	C
				3	1	0	1	5
C	P	A		L	T	P	SS	H
2.5	0.5	0		3	1	0	1	5

PREREQUISITE:

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance image fundamentals and mathematical transforms necessary for image processing.	Cognitive	Remember
CO2	***Express*** the knowledge on image enhancement techniques	Cognitive	Understand
CO3	***Employ*** and understand the image restoration and reconstruction procedures	Cognitive	Apply
CO4	***Utilize*** and exploit the image segmentation procedures.	Cognitive	Apply
CO5	***Recognize*** the color models.	Cognitive	Create

UNIT I	**DIGITAL IMAGE FUNDAMENTALS**	**12+6**

Digital Image Fundamentals: Elements of Visual Perception, Light, Brightness Adaption and Discrimination, Image Sensing and Acquisition, Image Sampling and Quantization, Pixels, Some Basic Relationships between Pixels, Coordinate Conventions, Imaging Geometry, Perspective Projection, Linear and Nonlinear Operations.

UNIT II	**IMAGE ENHANCEMENT**	**12+6**

Image Enhancement in the Spatial Domain: Intensity transformations, Contrast Stretching, Histogram Equalization, Correlation and Convolution, Basics of Spatial Filtering, Smoothing Filters, Sharpening Filters, Gradient and Laplacian.

UNIT III	**FILTERING IN THE FREQUENCY DOMAIN**	**12+6**

Filtering in the Frequency domain: Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2 -D sampling, Discrete Cosine Transform, Frequency domain filtering.

UNIT IV	**IMAGE RESTORATION AND RECONSTRUCTION**	**12+6**

Image Restoration and Reconstruction: Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from projections.

UNIT V	**COLOR IMAGE PROCESSING**	**12+6**

Color Image Processing, Color Fundamentals, Color Models, Pseudo color Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation. Morphological Image Processing, Dilation and Erosion, Opening and Closing., Extensions to Gray -Scale Images. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Segmentation by

Morphological Watersheds.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
30	**15**	**45**	**0**	**90**

TEXT BOOKS:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, 4th Edition, Prentice Hall.

REFERENCES:

1. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall.
2. Stan Birchfield, Image Processing and Analysis, Cengage Learning.

E-REFERENCES:

https://www.tutorialspoint.com/image processing/

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

XBC504B			**INTERNET TECHNOLOGIES**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**0**	**1**	**5**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.5	**0.5**	**0**		**3**	**1**	**0**	**1**	**5**

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 and Inter 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**
30	**15**	**45**	**0**	**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

XBC504C			**SYSTEM SECURITY**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**0**	**1**	**5**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0**	**0**		**3**	**1**	**0**	**1**	**5**

PREREQUISITE: XBC103, XBC402

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Understand***computer operating systems, distributed systems, networks and representative applications.	Cognitive	Remember
CO2	***Identify the*** distributed system attacks, defenses against them, and forensics to investigate the aftermath	Cognitive	Remember
CO3	***Analyze***the basics of cryptography, how it has evolved, and some key encryption techniques used today.	Cognitive	Analyze
CO4	***Recognize*** the security policies.	Cognitive	Remember
CO5	***Analyze*** the malicious software and DOS attacks.	Cognitive	Analyze

UNIT I	**CRYTOGRAHIC TOOLS**	**9+6**
Cryptographic Tools- Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers, Practical Application: Encryption of Stored Data.		

UNIT II	**USER AUTHENTICATION**	**9+6**
User Authentication- Means of Authentication, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, RemoteUser Authentication, Security Issues for User Authentication, Practical Application: An Iris Biometric System, Case Study: Security Problems for ATM Systems.		

UNIT III	**ACCESS CONTROL**	**9+6**
Access Control- Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control, Example: UNIX File Access Control, Role - Based Access Control, Case Study: RBAC System for a Bank.		

UNIT IV	**DATABASE SECURITY**	**9+6**
Database Security-The Need for Database Security, Database Management Systems, Relational Databases, Database Access Control, Inference, Statistical Databases, Database Encryption, Cloud Security.		

UNIT V	MALICIOUS SOFTWARE	9+6

Malicious Software-Types of Malicious Software (Malware), Propagation– Infected Content– Viruses, Propagation–Vulnerability Exploit–Worms, Propagation–Social Engineering–SPAM E-mail, Trojans, Payload–System Corruption, Payload–Attack Agent–Zombie, Bots, Payload–Information Theft– Key loggers, Phishing, Spyware, Payload–Stealthing–Backdoors, Rootkits,, Counter measures, Denial-of-Service Attacks- Denial-of-Service Attacks, Flooding Attacks, Distributed Denial-of-Service Attacks, Application-Based Bandwidth Attacks, Reflector and Amplifier Attacks, Defenses Against Denial -of-Service Attacks, Responding to a Denial-of-Service Att

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
30	15	45	0	90

TEXTBOOKS:

1. M. Stamp, "Information Security: Principles and Practice," 2 st Edition, Wiley, ISBN: 0470626399, 2011.
2. M. E. Whitman and H. J. Mattord, "Principles of Information Security," 4 st Edition, Course Technology, ISBN: 1111138214, 2011.
3. M. Bishop, "Computer Security: Art and Science," Addison Wesley, ISBN: 0 -201-44099-7, 2002.
4. G. McGraw, "Software Security: Building Security In," Addison Wesley, ISBN: 0321356705, 2006

REFERENCES:

1. David J. Kruglinski, Inside Visual C++, Microsoft Press 1992.
2. Boar, B.H., Implementing Client / Server Computing ; A Strategic Perspectre, Mcraw Hill, 1993.
3. Bouce Elbert, Client / Server Computing, Artech. Press, 1994.
4. Alex Berson, Client / Server Architecture, McGraw Hill, 1996.

E-REFERENCES:

fivedots.coe.psu.ac.th/~suthon/csw/01%20-%20Client%20Server%20Computing.pdf
www.bcanotes.com/Download/DBMS/Rdbms/Client_Server%20Computing.pdf

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	1	2	1	1	1	1	2	1
CO2	1	2	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	1	3	2	1	1	2	1	1
Average	1	1	2	1	1	1	1	2	1

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

XUMA005			**CYBER SECURITY**	**L**	**T**	**P**	**SS**	**C**
				1	0	0	0	**1**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0**	**0**		1	0	0	1	2

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	SELF STUDY	TOTAL
15	0	0	15	30

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/

XBC601A			WEB TECHNOLOGIES	L	T	P	SS	C
				3	0	1	1	5
C	P	A		L	T	P	SS	H
2	1	0		3	0	3	1	7

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	Cognitive Affective	Apply Respond

	creation of static and dynamic web pages.		
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

XBC601B			MOBILE APPLICATION AND DEVELOPMENT	L	T	P	SS	C
				3	0	1	1	5
C	P	A		L	T	P	SS	H
3	0	0		3	0	3	1	7

PREREQUISITE: Fundamentals of Computer

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Android platform and its architecture	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 thecloud data.	Cognitive	Create

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

(Introduction) What is Android, Android Versions and its Feature Set, Various Android Devices on the Market, Android Market Application Store, Android Development Environment System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs).

Lab:

1. Installing Android
2. Create a simple application

UNIT II	**ANDROID ARCHITECTURE OVERVIEW AND APPLICATION**	**9+6**

Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files.

Lab:

1. Working with fragments
2. Working with Intents and intent filters.
3. Creating contact based application.

UNIT III	**ANDROID SOFTWARE DEVELOPMENT PLATFORM AND FRAMEWORK**	**9+6**

Understanding Java SE and the Dalvik Virtual Machine, The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML, Screen Sizes , Launching Mobile Application: The AndroidManifest.xml File, Android Application Components, Android Activities: Defining the UI, Android Service s: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components.

Lab:

1. Working with views
2. Creating Dialogs and toasts
3. Working with Pop-up Menu

UNIT IV	**UNDERSTANDING ANDROID USER INTERFACES, VIEWS AND LAYOUTS**	**9+6**

Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool Displaying Text with

TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with Seek Bar, Working with Menus using views, Gallery, Image Switcher, Grid View, and Image View views to display images, Creating Animation.

Lab: 1. Quotes provider app
2. SQLite database app
. 3. Implement notification

UNIT V	**DATABASES, INTENTS, LOCATION-BASED SERVICES**	**9+6**

Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers Intents and Intent Filters: Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers. Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, sending email, Introduction to location-based service, configuring the Android Emulator for Location -Based Services, Geocoding and Map-Based Activities Multimedia: Audio, Video, Camera: Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures.

Lab:
1. Working with exception handling
2. Finding your location using GPS.
3. Bluetooth communication / SMS communication

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

TEXT BOOK

1. Android Programming Unleashed (1st Edition) by Harwani.
2. Beginning Mobile Application Development in the Cloud (2011), Richard Rodger

REFERENCES:

1. Professional Android 4 Application Development, 3rd edition, retomeier, wiley publication 2012.
2. Programming Android, 1st Edition, ZigurdMednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura, Oreilly publications, 2011.

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

XBC601C			CLOUD COMPUTING	L	T	P	SS	C
				3	0	1	1	5
C	P	A		L	T	P	SS	H
3	0	0		3	0	3	1	7

PREREQUISITE: Fundamentals of Computer

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Recognize*** the importance of cloud computing behind all communications and day to day life activities.	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the functionalities of each cloud services and aware of the various cloud service providers	Cognitive	Understand
CO3	***Employ*** the understanding of the various scheduling activities and actively ***participate*** in terms for the creation of various cloud services.	Cognitive	Apply Respond
CO4	***Utilize*** the cloud services tools effectively in the real world applications.	Cognitive	Apply
CO5	***Design*** and ***Establish*** the cloud services and cloud storage	Cognitive Psychomotor	Create Set

UNIT I	**INTRODUCTION TO CLOUD COMPUTING**	**9+6**

Definition, characteristics, components, Cloud service provider, the role of networks in Cloud computing, Cloud deployment models- private, public & hybrid, Cloud service models, multitenancy, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure, SaaS.

Lab:

1.Install Virtualbox /VMware Workstation with different flavours of linux or windows OS with virtualization support

2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs

UNIT II	**VIRTUALIZATION**	**9+6**

Virtualization concepts , Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, VMware hypervisors and their features.

Lab:

1. Install Google App Engine. Create hello world app and other simple web applications using python/java.

UNIT III	**DATA IN CLOUD COMPUTING**	**9+6**

Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map-Reduce model, Parallel efficiency of MapReduce, Relational operations using Map-Reduce, Enterprise batch processing using MapReduce.

Lab:

1.Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.

UNIT IV	**CLOUD SECURITY**	**9+6**

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud

computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges : Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.

Lab:

1. Experiment a procedure to transfer the files from one virtual machine to another virtual machine.
2. Experiment a procedure to launch virtual machine using trystack (Online Openstack Demo Version)

UNIT V	**ISSUES IN CLOUD COMPUTING**	**9+6**

Implementing real time application over cloud platform, Issues in Inter -cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoringin a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring.

Lab:

1.Install Hadoop single node cluster and run simple applications like word count

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

TEXT BOOK

1. System Analysis and Design – Awadh
2. Analysis & Design of Information system – James A. Senn –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	1	1	2	1	1	1	1	2	1
CO2	1	2	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	1	3	2	1	1	2	1	1
Average	1	1	2	1	1	1	1	2	1

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

XBC602A			**INTERNET OF THINGS**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**0**	**1**	**5**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0**	**0**		**3**	**1**	**0**	**1**	**5**

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	Cognitive	Create

	microcontrollers		
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 of Networking, 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, Protocol Classification, MQTT& SMQTT, IEEE 802.15.4, Zigbee)

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

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

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

Introduction to Python 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. CharalamposDoukas , 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

XBC602B			DATA MINING	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: DBMS

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Analyze*** and Demonstrate advanced knowledge of data mining concepts and techniques	Cognitive	Analyze
CO2	***Evaluate*** and Apply the techniques of clustering, classification, association finding, feature selection and visualization on real world data various mining techniques on complex data objects	Cognitive	Evaluate
CO3	***Understand and*** Determine whether a real-world problem has a data mining solution	Cognitive	Understand
CO4	***Choose and*** Apply data mining software and toolkits in a range of applications	Cognitive Affective	Apply Respond
CO5	***Recognize*** and Set up a data mining process for an application, including data preparation, modelling and evaluation	Cognitive Psychomotor	Analyze Perception

UNIT I	**INTRODUCTION TO DATA MINING**	**12**
Introduction to Data Mining, Understanding Data, Relations to Database, Statistics, Machine Learning.		

UNIT II	**ASSOCIATION RULE MINING**	**12**

Association Rule Mining, Level-wise Method, FP-Tree Method, Other Variants		
UNIT III	**CLASSIFICATION**	**12**
Classification, Decision Tree Algorithm, CART, PUBLIC, Pruning Classification Tree.		
UNIT IV	**CLUSTERING**	**12**
Clustering Techniques, Clustering of Numeric Data, of Ordinal Data, Efficiency of Clustering, Consensus Clustering, Spectral Clustering.		
UNIT V	**ROC ANALYSIS**	**12**
Rough Set Theory and its Application to Data Mining, ROC Analysis,Data Mining Trends, Big Data, Data Analytics.		

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

TEXT BOOK

1. Data Mining Techniques (4th Edition) Universities Press Arun K Pujari

REFERENCES:

1. Data Mining Introductory And Advanced Topics –Margaret H Dunham, Pearson Education

E-REFERENCES:

1. http://www.tutorialspoint.com/data_mining
2. http://www.dataminingconsultant.com/resources.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	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

XBC602C			**ARTIFICIAL INTELLIGENCE**	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 Structure

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

CO1	***Analyze*** what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence	Cognitive	Analyze
CO2	***Evaluate***AI methods, and which AI methods may be suited to solving a given problem.	Cognitive	Evaluate
CO3	***Understand*** a given problem in the language/framework of different AI methods.	Cognitive	Understand
CO4	***Choose an*** algorithm on a problem formalization, and state the conclusions that the evaluation supports.	Cognitive	Apply
CO5	***Recognize*** the limitations of current Artificial Intelligence techniques	Cognitive	Analyze

UNIT I	**INTRODUCTION TO ARTIFICAL INTELLIGENCE**	**12**

Introduction to Artificial Intelligence: Definition of AI; Turing Test; Brief History of AI. Problem Solving and Search: Problem Formulation; Search Space; States vs. Nodes; Tree Search: Breadth-First, Uniform Cost, Depth-First, Depth-Limited, Iterative Deepening; Graph Search.

UNIT II	**INFORMED SEARCH**	**12**

Informed Search: Greedy Search; A* Search; Heuristic Function; Admissibility and Consistency; Deriving Heuristics via Problem Relaxation. Local Search: Hill -Climbing; Simulated Annealing; Genetic Algorithms; Local Search in Continuous Spaces. Playing Games: Game Tree; Utility Function; Optimal Strategies; Minimax Algorithm; Alpha-Beta Pruning; Games with an Element of Chance. Beyond Classical Search: Searching with Nondeterministic Actions; Searching withPartial Observations; Online Search Agents; Dealing with Unknown Environments

UNIT III	**PLAYING GAMES**	**12**

Knowledge Representation and Reasoning: Ontologies, Foundations of Knowledge Representation and Reasoning, Representing andReasoning about Objects, Relations, Events, Actions, Time, and Space; Predicate Logic, Situation Calculus, Description Logics, Reasoning with Defaults, Reasoning about Knowledge, Sample Applications. Representing and Reasoning with Uncertain Knowledge: Probability, Connection to Logic, Independence, Bayes Rule, Bayesian Networks, Probabilistic Inference, and Sample Applications.

UNIT IV	**KNOWLEDGE REPRESENTATION AND REASONING**	**12**

Representing and Reasoning with Uncertain Knowledge: Probability, Connection to Logic, Independence, Bayes Rule, Bayesian Networks, Probabilistic Inference, and Sample Applications. Planning: The STRIPS Language; Forward Planning; Backward Planning; Planning Heuristics; Partial-Order Planning; Planning using Propositional Logic; Planning vs. Scheduling

UNIT V	**CONSTRAINT SATISFACTION PROBLEMS**	**12**

Constraint Satisfaction Problems (CSPs): Basic Definitions; Finite vs. Infinite vs.
Continuous Domains; Constraint Graphs; Relationship with Propositional Satisfiability, Conjunctive Queries, Linear Integer Programming, and Diophantine Equations; NP - Completeness of CSP; Extension to Quantified Constraint Satisfaction (QCSP). Constraint Satisfaction as a Search Problem; Backtracking Search; Variable and Value Ordering Heuristic; Degree Heuristic; Least-Constraining Value Heuristic; Forward Checking; Constraint Propagation; Dependency-Directed Backtracking;

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

TEXT BOOK
Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Third Edition, McGraw Hill Edition
REFERENCES:
Russell Stuart Jonathan and Norvig Peter, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, 2010

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

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

XBC602D			COMPUTER GRAPHICS	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: Algorithms

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Analyze*** the concepts and relevant mathematics of computer graphics.	Cognitive	Analyze
CO2	***Evaluate***various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.	Cognitive	Evaluate
CO3	***Understand*** the importance of viewing and projections.	Cognitive	Understand
CO4	***Choose a*** design application that display graphic images to given specifications.	Cognitive	Apply
CO5	***Recognize*** the fundamentals of animation and Virtual reality technologies	Cognitive	Analyze
UNIT I	**APPLICATION AREAS OF COMPUTER GRAPHICS**		**12**

Application Areas of Computer Graphics, Overview of Graphics Systems and Devices. Points and Lines, Line Drawing Algorithms, Mid -Point Circle and Ellipse Algorithms. Filled Area Primitives, Polygon Filling Algorithms. Curve Generation: Bezier and B-Spline Curves.		
UNIT II	**2-D GEOMETRICAL TRANSFORMS**	**12**
2-D Geometrical Transforms: Translation, Scaling, Rotation, Reflection and Shear Transformations Composite Transforms, Transformations between Coordinate Systems. 2-D Viewing: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window to Viewport Coordinate Transformation, Viewing Functions. Line Clipping Algorithms- Cohen-Sutherland and Cyrus Beck Line Clipping Algorithms, Sutherland–Hodgeman Polygon Clipping Algorithm.		
UNIT III	**3-D OBJECT REPRESENTATION**	**12**
3-D Object Representation: Polygon Surfaces, Quadric Surfaces, Spline Representation. 3-D Geometric Transformations: Translation, Rotation, Scaling, Reflection and Shear Transformations, Composite Transformations, 3-D Viewing: Viewing Pipeline, Viewing Coordinates, View Volume, General Projection Transforms and Clipping.		
UNIT IV	**VISIBLE SURFACE DETECTION METHODS**	**12**
Visible Surface Detection Methods: Classification, Back -Face Detection, Depth- Buffer, Scanline, Depth Sorting, BSP-Tree Methods, Area Sub-Division and Octree Methods Illumination Models and Surface Rendering Methods: Basic Illumination Models, Polygon Rendering Methods Computer Animation: Design of Animation Sequence, General Computer Animation Functions Key Frame Animation, Animation Sequence, Motion Control Methods, Morphing, Warping (Only Mesh Warping)		
UNIT V	**VIRTUAL REALITY**	**12**
Virtual Reality: Basic Concepts, Classical Components of VR System, Types of VR Systems, Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces, Gesture Interfaces. Input Devices, Graphical Rendering Pipeline, Haptic Rendering Pipeline, Open GL Rendering Pipeline. Applications of Virtual Reality.		

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

TEXT BOOK

1. Donald Hearn and M. Pauline Baker, “Computer Graphics with Open GL”, Prentice Hall.
2. R. K Maurya, “Computer Graphics with Virtual Reality”, Wiley

REFERENCES:

1. “Computer Graphics Principles & practice”, Foley, Van Dam, Feiner and Hughes, Pearson Education.

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

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 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

XBC603B			HUMAN COMPUTER INTERFACE	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	***Analyze*** the concepts relating to the design of human - computer interfaces in ways making computer-based systems comprehensive, friendly and usable	Cognitive	Analyze
CO2	Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces	Cognitive	Evaluate
CO3	Choose the important aspects of implementation of human-computer interfaces	Cognitive	Apply
CO4	Identify the various tools and techniques for interface analysis, design, and evaluation.	Cognitive	Apply

CO5	Identify the impact of usable interfaces in the acceptance and performance utilization of information systems.	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**12**

Introduction: Historical Evolution of HCI, Interactive System Design: Concept of Usability-Definition and Elaboration, HCI and Software Engineering, GUI Design and Aesthetics, Prototyping Techniques.

UNIT II	**MODEL-BASED DESIGN**	**12**

Model-Based Design and Evaluation: Basic Idea, Introduction to Different Types of Models, GOMS Family of Models (KLM And CMN -GOMS), Fitts' Law and Hickhyman's Law.

UNIT III	**GENERAL DEVELOPMENT**	**12**

General Development Guidelines and Principles: Shneiderman's Eight Golden Rules, Norman's Seven Principles, Norman's Model of Interaction, Nielsen's Ten Heuristics with Example of its use, Contextual Inquiry.

UNIT IV	**DIALOG DESIGN**	**12**

Dialog Design: Introduction to Formalism in Dialog Design, Design using FSM (Finite State Machines), State Charts and (Classical) Petri Nets in Dialog Design. Task Modeling and Analysis: Hierarchical Task Analysis (HTA), Engineering Task
Models and Concur Task Tree (CTT).

UNIT V	**OBJECT ORIENTED MODELLING**	**12**

Object Oriented Modelling: Object Oriented Principles, Definition of Class and Object and their Interactions, Object Oriented Modelling for User Interface Design, Case Study Related to Mobile Application Development.

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

TEXT BOOK

1. Dix A., Finlay J.,Abowd G. D. and Beale R. Human Computer Interaction, 3 rd edition, Pearson Education, 2005.
2. Preece J., Rogers Y.,Sharp H.,Baniyon D., Holland S. and Carey T. Human Computer
3. Interaction,Addison-Wesley, 1994.
4. B.Shneiderman; Designing the User Interface,Addison Wesley 2000 (Indian Reprint).

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

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

XBC603C			DATA ANALYTICS	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*** what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence	Cognitive	Analyze
CO2	***Evaluate***AI methods, and which AI methods may be suited to solving a given problem.	Cognitive	Evaluate
CO3	***Understand*** a given problem in the language/framework of different AI methods.	Cognitive	Understand
CO4	***Choose an*** algorithm on a problem formalization, and state the conclusions that the evaluation supports.	Cognitive	Apply
CO5	***Recognize*** the limitations of current Artificial Intelligence techniques	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**12**

Data Definitions and Analysis Techniques: Elements, Variables, and Data Categorization, Levels of Measurement, Data Management and Indexing.

UNIT II	**DESCRIPTIVE STATISTICS**	**12**

Descriptive Statistics: Measures of Central Tendency, Measures of Location of Dispersions, Error Estimation and Presentation (Standard Deviation, Variance), Introduction to Probability

UNIT III	**BASIC ANALYSIS TECHNIQUES**	**12**

Basic Analysis Techniques: Statistical Hypothesis Generation and Testing, Chi-Square Test, T -Test, Analysis of Variance, Correlation Analysis, Maximum Likelihood Test.

UNIT IV	**DATA ANALYSIS TECHNIQUES-I**	**12**

Data Analysis Techniques - I: Regression Analysis, Classification Techniques, Clustering Techniques (K-Means, K-Nearest Neighborhood). Data Analysis Techniques-II: Association Rules Analysis, Decision Tree.

UNIT V	**INTRODUCTION TO R PROGRAMMING**	**12**

Introduction to R Programming: Introduction to R Software Tool, Statistical Computations using R (Mean, Standard Deviation, Variance, Regression, Correlation etc.). Practice and Analysis with R and Python Programming, Sensitivity
Analysis.

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

TEXT BOOK

1. Probability and statistics for Engineers and Scientists (9 Edn.), Ronald E Walppole, Raymond H Myres, Sharon L. Myres and Leying Ye, Prentice Hall Inc
2. The Elements of Statistical Learning, Data Mining, Inference, and Prediction (2nd Edn.) Travor Hastie Robert Tibshirani Jerome Friedman, Springer, 2014

REFERENCES:

1. Software for Data Analysis: Programming with R (Statistics and Computing), John M. Chambers, Springer

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

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

4. Curriculum and Syllabus of the programme – After Revision

CURRICULUM for B. Sc (Computer Science)
REGULATIONS – 2023
(Applicable to the students admitted from the Academic year 2023-24)
I SEMESTER

II SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 3	XGT201/ XFT201	Tamil – II/ Foundational Tamil - II	3	0	0	0	**3**	3	0	0	0	**3**
AECC 4	XGE202	English – II	3	0	0	0	**3**	3	0	0	0	**3**
CC- 2A	XBC203	Data Structures	4	1	0	0	**5**	4	1	0	0	**5**
CC- 2B	XBC204	Discrete Mathematics	3	1	0	0	**4**	3	1	0	0	**4**
CC- 2C	XBC205	Object oriented programming	3	1	0	1	**5**	3	1	0	1	**5**
CC-2A Lab	XBC206	Data Structures Lab	0	0	2	0	**2**	0	0	3	0	**3**
CC- 2C Lab	XBC207	Object oriented programming Lab	0	0	2	0	**2**	0	0	3	0	**3**
UMAN-2	XUMA002	Environmental Studies	1	0	0	0	**1**	1	0	0	1	**2**
Extension Activities (NSS,NCC,NSO,RRC and Swachh Bharath)											2	**2**
Mentor Hour												**1**
Library Hour												**1**

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 1	XGT101/ XFT101	Tamil –I/ Foundational Tamil - I	3	0	0	0	**3**	3	0	0	0	**3**
AECC 2	XGE102	English – I	3	0	0	0	**3**	3	0	0	0	**3**
CC-1A	XBC103	Programming in C	4	1	0	0	**5**	4	1	0	0	**5**
CC-1B	XBC104	Algebra, Calculus & Analytical Geometry	4	1	0	0	**5**	4	1	0	0	**5**
CC-1C	XBC105	Computer Fundamentals	4	1	0	0	**5**	4	1	0	0	**5**
CC-1A-Lab	XBC106	Programming in C Lab	0	0	2	0	**2**	0	0	3	0	**3**
CC-1C Lab	XBC107	Computer Fundamentals Lab	0	0	2	0	**2**	0	0	3	0	**3**
UMAN-1	XUMA001	Human Ethics, Values, Rights, and Gender Equality	1	0	0	0	**1**	1	0	0	1	**2**
Extension Activities (NSS, NCC, NSO, RRC and Swachh Bharath)											1	**1**
Mentor Hour												**1**
Library Hour												**1**
		Total	**19**	**3**	**4**	**0**	**26**	**19**	**3**	**6**	**2**	**30+2**

		Total	**17**	**3**	**4**	**1**	**25**	**17**	**3**	**6**	**4**	**30+ 2**

III SEMESTER

Category	**Course Code**	**Course Name**	**Credits**					**Hours**				
			L	**T**	**P**	**SS**	**Total**	**L**	**T**	**P**	**SS**	**Total**
AECC 5	XGT301/ XFT301	Tamil – III/ Foundational Tamil – III	3	0	0	0	**3**	3	0	0	0	**3**
AECC 6	XGE302	English – III	3	0	0	0	**3**	3	0	0	0	**3**
SEC-1B	XBC303	Multimedia Systems	2	0	0	0	**2**	2	0	0	0	**2**
CC- 3A	XBC304	Operating System	2	1	0	0	**3**	2	1	0	0	**3**
CC- 3B	XBC305	Algorithms	3	0	0	0	**3**	3	0	0	0	**3**
CC- 3C	XBC306	Auxiliary Physics	3	1	0	0	**4**	3	1	0	0	**4**
GE-1		*Open Elective - To be chosen by student	3	0	0	0	**3**	3	0	0	0	**3**
CC- 3B Lab	XBC307	Algorithms Lab	0	0	2	0	**2**	0	0	3	0	**3**
CC- 3C Lab	XBC308	Auxiliary Physics Lab	0	0	2	0	**2**	0	0	3	0	**3**
UMAN	XUMA003	Disaster Management	1	0	0	0	**1**	1	0	0	0	**1**
Minor Course	XBC309	Dreamweaver * Extra Credit	1	0	0	0	**1***	1	0	0	0	**1**
Extension Activities (NSS,NCC,NSO,RRC and Swachh Bharath)											1	**1**
Mentor Hour												**1**
Library Hour												**1**
		Total	**20+ 1***	**2**	**4**	**0**	**26+ 1***	**21**	**2**	**6**	**1**	**30 +2**

IV SEMESTER

Category	**Course Code**	**Course Name**	**Credits**					**Hours**				
			L	**T**	**P**	**SS**	**Total**	**L**	**T**	**P**	**SS**	**Total**
AECC 7	XGT401/ XFT401	Tamil – IV/ Foundational Tamil -	3	0	0	0	**3**	3	0	0	0	**3**

		IV										
AECC 8	XGE402	English - IV	3	0	0	0	**3**	3	0	0	0	**3**
SEC-2B	XBC403	Programming in Java	3	0	0	0	**3**	3	0	0	0	**3**
CC - 4A	XBC404	Database Management Systems	3	0	0	0	**3**	3	0	0	0	**3**
CC - 4B	XBC405	Statistics	3	1	0	1	**5**	3	1	0	1	**4+1**
CC - 4C	XBC406	Principles of Management	3	0	0	0	**3**	3	0	0	0	**3**
GE-2		*Open Elective - To be chosen by student	3	0	0	0	**3**	3	0	0	0	**3**
SEC-2B Lab	XBC407	Programming in Java Lab	0	0	1	0	**1**	0	0	2	0	**2**
CC - 4A Lab	XBC408	DBMS Lab	0	0	1	0	**1**	0	0	2	0	**2**
UMAN4	XUMA004	Introduction to Entrepreneurship Development	1	0	0	0	**1**	1	0	0	1	**2**
Minor Course	XBC409	Online content Creation *Extra Credit	1*	0	0	0	**1***	1	0	0	0	**1**
Extension Activities (NSS,NCC,NSO,RRC and Swachh Bharath)											1	**1**
Mentor Hour												**1**
Library Hour												**1**
		Total	**22+1***	**1**	**2**	**1**	**26+1***	**22+1**	**1**	**4**	**3**	**30+2**

V SEMESTER

Category	**Course Code**	**Course Name**	**Credits**					**Hours**				
			L	**T**	**P**	**SS**	**Total**	**L**	**T**	**P**	**SS**	**Total**
SEC-3A	XBC501A	MATLAB Programming	3	1	0	0	**4**	3	1	0	0	**4**
	XBC501B	Fundamentals of R Programming										
	XBC501C	Python Programming										
DSE-1A	XBC502A	Software Engineering	3	1	0	0	**4**	3	1	0	0	**4**
	XBC502B	Computer Ethics										
	XBC502C	Computer Organization & Architecture										
	XBC502D	Computer Networks										
DSE-1B	XBC503A	.NET Technologies	3	1	0	0	**4**	3	1	0	0	**4**

	XBC503B	GIMP (GNU Image Manipulation Program)											
	XBC503C	Theory of Computation											
DSE-1C	XBC504A	Image Processing											
	XBC504B	Internet Technologies	3	1	0	0	**4**	3	1	0	0	**4**
	XBC504C	System Security											
GE-3		*Open Elective - To be chosen by student	3	0	0	0	**3**	3	0	0	0	**3**
SEC-3A Lab	XBC505A	MATLAB Programming Lab											
	XBC505B	R Programming Lab	0	0	2	0	**2**	0	0	3	0	**3**
	XBC505C	Python Programming Lab											
DSE-1B Lab	XBC506A	.NET Lab											
	XBC506B	GIMP (GNU Image Manipulation Program) Lab	0	0	2	0	**2**	0	0	3	0	**3**
	XBC506C	Theory of Computation Lab											
UMAN5	XUMA005	Cyber Security	1	0	0	0	**1**	1	0	0	1	**2**
Extension Activities (NSS,NCC,NSO,RRC and Swachh Bharath)											1	**1**
Mentor Hour												**1**
Library Hour												**1**
	XBC507	IPT 21 Days	0	0	0	0	**2**	0	0	0	0	**0**
			16	**4**	**4**	**0**	**26**	**16**	**4**	**6**	**2**	**30**

VI SEMESTER

Category	**Course Code**	**Course Name**	**Credits**					**Hours**				
			L	**T**	**P**	**SS**	**Total**	**L**	**T**	**P**	**SS**	**Total**
SEC-4A	XBC601A	Web Technologies										
	XBC601B	Mobile Application Development	3	1	0	0	**4**	3	1	0	0	4
	XBC601C	Cloud Computing										

DSE-2A	XBC602A	Internet of Things	3	1	0	0	**4**	3	1	0	0	**4**
	XBC602B	Data Mining										
	XBC602C	Artificial Intelligence										
	XBC602D	Computer Graphics										
DSE–2B	XBC603A	Introduction to Machine Learning	3	1	0	0	**4**	3	1	0	0	**4**
	XBC603B	Human Computer Interface										
	XBC603C	Data Analytics										
SEC-4A Lab	XBC604A	Web Technologies Lab	0	0	1	0	**1**	0	0	2	0	**2**
	XBC604B	Mobile Application Development Lab										
	XBC604C	Cloud Computing Lab										
DSE-2C	XBC605	Project Work	0	0	6	0	**6**	**0**	**0**	**12**	**0**	**12**
Extension Activities (NSS,NCC,NSO,RRC and Swachh Bharath)											1	**1**
Mentor Hour												**1**
Library Hour												**1**
			9	**3**	**7**	**0**	**19**	**9**	**3**	**14**	**1**	**29**

Course Code		L	T	P	C
Course Name	**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	*Recognize* (அடையாளம் காணுதல்) பல்வேறு அறிஞர் பெருமக்களின் தொண்டுகளைத் தமிழ்மொழி மூலம் அறிந்து கொள்ளல்.	Cognitive	Remember
CO2	*Choose* (தெரிவு செய்தல்) பன்முகப் பரிமாணங்களின் கவிதைகளை இலக்கியங்கள் மூலம் அறிந்து கொள்ளல்.	Cognitive	Remember
CO3	*Describe* (விளக்குதல்) தமிழ் மகளிரின் உரையாடல் சிறப்புச் செய்திகளை உணர்தல்.	Cognitive	Understand
CO4	*Apply* (விளக்குதல்) பல்வேறு கலைத்துறைச் சார்ந்த பிரிவுகள், மண்ணின் பாடல்கள் குறித்துத் தெளிவு பெறல்.	Cognitive	Apply
CO5	*Analyze* (பகுத்தல்) சிறுகதைகளின் தோற்றம் மற்றும் வளர்ச்சி நிலை நாடகங்கள் - கவிதை குறித்துத் தெளிவு பெறுதல்.	Cognitive	Analyze

அலகு-1	**தமிழ் அறிஞர்களும் தமிழ்த்தொண்டும்**	9
பாரதியார், பாரதிதாசன், நாமக்கல் கவிஞர், சி.இலக்குவனார், உ.வே.சாமிநாத அய்யர், தெ.பொ.மீனாட்சி சுந்தரம், கவிமணி தேசியவிநாயகம் பிள்ளை தொடர்பான செய்திகள், சிறந்த தொடர்கள், சிறப்புப் பெயர்கள்.		
அலகு-2	**கவிதைகள் (மரபுக்கவிதை, புதுக்கவிதை)**	9
மரபுக்கவிதை : முடியரசன், வாணிதாசன், சுரதா, கண்ணதாசன், உடுமலை நாராயண கவி, பட்டுக்கோட்டை கல்யாண சுந்தரம், மருதகாசி தொடர்பான செய்திகள். புதுக்கவிதை : ந.பிச்சமூர்த்தி, சி.சு.செல்லப்பா, மு.மேத்தா, ஈரோடு தமிழன்பன், அப்துல் ரகுமான், ஞானக்கூத்தன், ஆலந்தூர் மோகனரங்கன் தொடர்பான செய்திகள்.		
அலகு-3	**உரையாடல்கள், தமிழ் மகளிரின் சிறப்பு**	9
ஜி.யு.போப் மற்றும் வீரமாமுனிவரின் தமிழ்ப்பணி, பெரியார், அண்ணா, முத்துராமலிங்கத்தேவர், அம்பேத்கர், காமராசர், மா.பொ.சிவஞானம், காயிதே மில்லத் சமுதாயத் தொண்டு. அன்னி பெசண்ட் அம்மையார், மூவாலூர் ராமாமிர்தம்மாள், டாக்டர் முத்துலட்சுமி ரெட்டி, வேலுநாச்சியார், வள்ளியம்மை, ராணி மங்கம்மாள் சிறப்பு.		
அலகு-4	**நாட்டுப்புறப்பாடல்**	9
தாலாட்டுப்பாடல், தொழில் பாடல், ஒப்பாரிப் பாடல்.		
அலகு-5	**இலக்கிய வரலாறு**	9
உரைநடை, சிறுகதை, நாடகம், கவிதைகள்.		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	—	—	45

பாட நூல்கள்:

1. முனைவர் கா.செல்வகுமார் (தொ.ஆ.), பொதுத்தமிழ், மார்ச் - 2022, துரைகோ பதிப்பகம், அரும்பாக்கம், சென்னை – 106. 9884159972.
2. முனைவர் மு.அருணாசலம் (ப.ஆ.) – தமிழ் இலக்கிய வரலாறு – 2012, அருண் பதிப்பகம், தரைத்தளம், பாலாஜி நகர், ளுடீஐ காலனி, கண்டோன்மெண்ட், திருச்சி - 1. 9894440530
3. சு.சக்திவேல் - நாட்டுப்புற இயல் ஆய்வு, மணிவாசகர் பதிப்பகம் - 12, மேலசன்னதி வீதி, சிதம்பரம் - 1.
4. முனைவர் கோ.பெரியண்ணன் - அடிப்படை எளிய தமிழ் இலக்கணம் - 2003 –வனிதா பதிப்பகம், 11- நானா தெரு, பாண்டி பஜார், தி.நகர், சென்னை - 17.

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.

பார்வை நூல்கள்:

1. முனைவர் ந.லெனின், தாலாட்டுப் பாடல், பிப்ரவரி - 2015, பிருந்தா பதிப்பகம், தஞ்சாவூர் - 5.
2. கோ. வெங்கடாசலம் (தொ.ஆ.) - 2005, தமிழ் இலக்கிய கைவிளக்கு, அன்னை சரஸ்வதி பதிப்பகம், குடியாத்தம்.
3. முனைவர் இராஜா வரதராஜா - பயன்முறைத் தமிழ் - ஜூன் 2015, சிவகுரு பதிப்பகம், 7.̓.40, கிழக்குச் செட்டித்தெரு, பரங்கிமலை, சென்னை – 16.

COURSE CODE	XGE102	L	T	P	SS	H	C
COURSENAME	ENGLISH I	3	0	0	0	3	3
C:P:A- 3:0:0							

COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:		Domain	Level
CO1	***Develop*** and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	Cognitive	Understand
CO2	***Understand*** the total content and underlying meaning in the context.	Cognitive	Apply
CO3	***Form*** the habit of reading for pleasure and for information	Cognitive	Understand
CO4	***Comprehend*** material other than the prescribed text	Cognitive	Understand
CO5	***Develop*** the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	Cognitive	Understand

SYLLABUS		HOURS
UNIT-I	**POETRY**	**6+3+0=9**
1.1 A Patch of Land - Subramania Bharati 1.2 The Sparrow - Paul Laurence Dunbar 1.3 A Nation's Strength – Ralph Waldo Emerson 1.4 Love Cycle - Chinua Achebe		
UNIT-II	**PROSE**	**6+3+0=9**
2.1 JRD - Harish Bhat 2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim 2.3 Uncle Podger Hangs a Picture - Jerome K Jerome		
UNIT-III	**SHORT STORIES**	**6+3+0=9**
3.1 The Faltering Pendulum- Bhabani Bhattacharya		

UNIT - V	**ENGLISH FOR WORKPLACE**	
5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions		
L=30 / T=15	**Total Hour**	
Tutorial Activities 1) Reading and understanding incomplete texts 2) Summarize a piece of prose or poetry 3) Communication Practice 4) Role play		
Text books • Hogan, Sharon. The Art of Civilized Conversation: A Guide to Expressing Yourse with Style and Grace -Margaret Shepherd,Penny Carter, (Illustrator), 2015. • Kumar, Vijay T. English in Use - *A Textbook For College Students* (English ,Pap back, - K Durga Bhavani, YL Srinivas,2015 • Murthy, Sudha. *How I taught my Grandmother to Read and other Stories*. Pengu Books, India, 2014 • Swan, Michael. *Practical English Usage* - 4th Edition By, 2018		
3.2 How I Taught my Grandmother to Read - Sudha Murthy 3.3 The Gold Frame- R.K. Laxman		
UNIT-IV	**LANGUAGE COMPETENCY**	**6+3+0=9**
4.1 Vocabulary : Synonyms, Antonyms, Word Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction		

XBC103			**PROGRAMMING IN C**	**L**	**T**	**P**	**SS**	**C**
				4	**1**	**0**	**0**	**5**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.5	**1**	**0.5**		**4**	**1**	**0**	**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**

Algorithms-Flowchart- Structure of C program- Data and Data Types- Declaring and Definition of Data types –Operators - Input and Output Statements – Conditional statements - Branching Statements – Looping statements.

UNIT II	**FUNCTIONS**	**12+3**

Arguments and Parameters – Types of Function – Structure of Function –Arguments/Parameter passing - Function Call by value –Call by reference - Recurrence Function

UNIT III	**ARRAYS**	**12+3**

Arrays – definition – Types of arrays – Uses of Array - Pointers –definition – initialization – Assignment – Pointer array – Dynamic memory allocation.

UNIT IV	**STRUCTURES**	**12+3**

Structure – definition –Declaration and Definition of Structure – C Program using Structure – Union – Declaration and Definition – C program using Union.

UNIT V	**FILES ANDSEARCHING ALGORITHMS**	**12+3**

File – Create –Open - Read – Write – Move – Close – C Program for File Handling.

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

TEXT BOOKS

3. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, Edition-7.
4. Programming in Ansi C, E Balaguruswamy,Eighth Edition- .

REFERENCES

3. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2020).
4. 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

http://www.comptechdoc.org/basic/basictut/index.html

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	0	5
C	P	A		L	T	P	SS	H
4	0	0		4	1	0	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. Pratima Panigrahi, 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	4	1	0	0	5
PREREQUISITES	Nil	L	T	P	SS	H

C:P:A		3:1:0	4	1	0	0	5
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	**12+3**
Introduction – Characteristics of computer – Evolution of computer- Generationof computer – classification of computer- The Computer system –Applications of computers	

UNIT II - COMPUTER ARCHITECTURE	**12+3**
The Central processing unit (CPU) – Main Memory Unit – Interconnection Unit – Cache – Communication between various units of a computer system.	

UNIT III - PRIMARY AND SECONDARY MEMORY	**12+3**
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	

UNIT IV - INPUT AND OUT PUT DEVICES	**12+3**
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	

UNIT V	**COMPUTER PROGRAM AND LANGUAGES**	**12+3**
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		

LECTURE	**TUTORIAL**	**PRACTICAL**	**Self-Study**	**TOTAL**
60	**0**	**0**	**15**	**60+75**

Text books

Dorling Kindersley, 2011. 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			**XBC106**	**L**	**T**	**P**	**C**
COURSE NAME			**PROGRAMMING IN C LAB**	**0**	**0**	**2**	**2**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1**	**1**		**0**	**0**	**2**	**3**
PREREQUISITE			Programming in C (Theory)				

COURSE OUTCOMES:

Course outcomes:		**Domain**	**Level**
CO1	**Apply Control Statements**	Psychomotor	**Apply**
CO2	**Describe** functions and Apply various passing methods	Psychomotor	**Apply**
CO3	**Apply Structure and Unions**	Psychomotor	**Apply**
CO4	***Apply arrays and pointers***	Psychomotor	**Apply**
CO5	**Apply and Implement file operations.**	Psychomotor	**Apply**

Unit I Introduction	**3 Hours**
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: To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.	
Unit II Functions	**3 Hours**
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: Learn how to use functions and parameter passing in functions, writing recursive programs.	
Unit III Structures and Union	**3 Hours**
Write a Program to learn Problems which can effectively demonstrate use of Structures and Union.	
Unit IV Arrays and Pointers	**3 Hours**
Write a Program by using Arrays and Pointers	
Unit V File Handling	**3 Hours**
Write a Program to do all File Handling Process.	

HOURS	**Practical**	**TOTAL**
	45	**45**

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

COURSE CODE			**XBC107**	**L**	**T**	**P**	**C**
COURSE NAME			**Computer Fundamentals Lab**	**0**	**0**	**2**	**2**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1.5**	**0.5**		**0**	**0**	**2**	**3**
PREREQUISITE			Computer Fundamentals (Theory)				

COURSE OUTCOMES:			
Course outcomes:		**Domain**	**Level**
CO1	**Explain** the Text creation, Resume creation and table creation	Psychomotor	**Apply**
CO2	**Describe** the work sheet creation by using various formula	Psychomotor	**Apply**
CO3	**Identify** the various effects to create power point presentation	Psychomotor	**Apply**
CO4	***Describe*** *Macro*	Psychomotor	**Apply**
CO5	**Explain** the creation of greeting card and cover page	Psychomotor	**Apply**

Unit I Introduction	**3 Hours**
Text Processing Table Creation Resume Creation Mail Merge.	
Unit II	**3 Hours**
Worksheet Creation Employee Pay Details , Student Result Sheet Simple Charts	
Unit III	**3 Hours**
Power Point Preparation Create Text And Images With Effects Create Animation And Sound Effects	
Unit IV	**3 Hours**
Importing Data From Data Base Creating Macro Result Processing	
Unit V	**3 Hours**
Creating A Greeting Card Creating A Cover Page Of A Project	

HOURS	**Practical**	**TOTAL**
	45	**45**

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	**XUMA001**	**L**	**T**	**P**	**SS**	**C**
COURSE NAME	**HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY**	**1**	**0**	**0**	**0**	**1**
PREREQUISITES	**-**	**L**	**T**	**P**	**SS**	**H**
C:P:A	**1.5:0:0.5**	**1**	**0**	**0**	**1**	**2**

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

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. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
10. 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

COURSE CODE	**XGE202**	**L**	**T**	**P**	**SS**	**H**	**C**
COURSENAME	**ENGLISH II**	**3**	**0**	**0**	**0**	**3**	**3**
C:P:A- 3:0:0							

COURSE OUTCOMES: **After the completion of course, the learners will be able to get comprehensive skills like:**		**Domain**	**Level**
CO1	***Learn*** to introduce themselves and talk about everyday activities confidently	Cognitive	Understand
CO2	A***ble*** to write short paragraphs on people, places and events	Cognitive	Apply
CO3	***Identify*** the purpose of using various tenses and effectively employ them in speaking and writing	Cognitive	Understand
CO4	***Gain*** knowledge to write subjective and objective descriptions	Cognitive	Understand
CO5	***Identify*** and use their skills effectively in formal contexts.	Cognitive	Understand

SYLLABUS		**HOURS**
UNIT-I	**POETRY**	**6+3+0=9**
1.1Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3 The Flower -Tennyson 1.4 On Killing a Tree - Gieve Patel		
UNIT-II	**PROSE**	**6+3+0=9**
2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please - Shashi Tharoor 2.3 The Spoon-fed Age- W.R. Inge		
UNIT-III	**FICTION**	**6+3+0=9**
Alchemist - Paulo Coelho		
UNIT-IV	**LANGUAGE COMPETENCY**	**6+3+0=9**
4.1 Homonyms, Homophones, Homographs Portmanteau words 4.2 Verbs and Tenses, Subject Verb Agreement 4.3 Error correction		
UNIT - V	**ENGLISH FOR WORKPLACE**	**6+3+0=9**
5.1 Reading for General and Specific Information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes		

L=30 / T=15	Total Hours	45
Tutorial Activities 5) Reading and understanding incomplete texts 6) Summarize a piece of prose or poetry 7) Communication Practice 8) Role play		
Textbooks • Coelho, Paulo. *The Alchemist.* Harper ,2016 • Chambers, Pearson. *Brilliant Speed Reading: Whatever you need to read, however* ...Phil, 2013 • Hewings, Martin. *Advanced English Grammar.* Cambridge University Press, 2000 • Sharma, Richa *Descriptive English.* Arihant Publications (India) Ltd, 2019 **E- Resources:** • Very Indian poem by Nissim Ezekiel • http://econtent.in/pacc.in/admin/contents/40_%20_2020103001102714.pdf • Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/ still-i-rise • Kindly Adjust please - Shashi Tharoor • https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3IhtdXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKgiNKKwdkeSg3qWp-U/ • The Alchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU		

XBC203			DATA STRUCTURES	L	T	P	SS	C
				4	1	0	0	5
C	P	A		L	T	P	SS	H
3	1	0		4	1	0	0	5

PREREQUISITE: Computer Fundamentals

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 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	Analyse

CO5	Ability to assess efficiency trade-offs among different data structure implementations. Implement and know the applications of algorithms for sorting, pattern matching etc.	Cognitive	Create

UNIT I	**INTRODUCTION**	**12+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**	**12+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**	**12+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**	**12+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**	**12+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
60	**15**	**0**	**0**	**75**

Text Books:

4. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
5. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson

References:

6. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
7. www.tutorialspoint.com
8. www.nptel.com
9. www.virtuallab.ac.in
10. Lecture Slides, Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html

Lecture Slides :http://www.mhhe.com/engcs/compsci/forouzan/

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

XBC204			**DISCRETE MATHEMATICS**	**L**	**T**	**P**	**SS**	**C**
				3	1	0	0	4
C:P:A			**NIL**	**L**	**T**	**P**	**SS**	**H**
3	0	0		3	1	0	0	**4**
PREREQUISITE: NIl				**Domain**		**Level**		
Course Outcome								
CO1	***Define*** the properties and laws of sets, relations and functions and***Apply*** the operation of the sets using venDiagram.			**Cognitive**		Remember, Apply		
CO2	***Apply***the concepts of logic and to find the normal forms. ***Explain*** the tautologies and Contradiction.			**Cognitive**		Understand Apply		
CO3	***Apply*** the counting principle permutation and combination and to ***solve*** the problem. ***Explain*** the pigeonhole principle.			**Cognitive**		Understand Apply		
CO4	***Explain*** the types of lattices and to ***show*** lattices as partially ordered sets.			**Cognitive**		Understand Apply		
CO5	***Apply*** **the** properties of semi groups and groups and Explain any set with binary operation as a semi group and group with examples.			**Cognitive**		Understand Apply		
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

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

REFERENCES

4. Kenneth H.Rosen, "Discrete Mathematics and its Application", Fifth edition, Tata McGraw-Hill Publishing company pvt.Ltd., New Delhi, 2003.
5. Dr.M.K.Venkataraman, Dr.N.SridharanN.Chandrasekaran, "Discrete Mathematics", the National Publishing Company, 2003.
6. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics", 10th edition,Tata McGraw Hill Companies,2010.

E REFERENCES

4. www.nptel.ac.in
5. Graph Theory A NPTEL Course S.A. Choudum.
6. 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			OBJECT ORIENTED PROGRAMMING	L	T	P	SS	C
				3	1	0	1	5
C	P	A		L	T	P	SS	H
2.5	1	0.5		3	1	0	1	5

PREREQUISITE: Programming in 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+3

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.

UNIT II	OBJECT ORIENTED AND PROCEDURE ORIENTED PROGRAMMING	9+3

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.

UNIT III	INHERITANCE	9+3

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.

UNIT IV	FILE STREAMS	9+3

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

UNIT V	EXCEPTION HANDLING	9+3

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

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	15	0	0	60

TEXT BOOKS

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

REFERENCES:
4. Object Oriented Programming with C++, Sourav Sahay, 2nd Edition, Oxford 5. The C++ Programming Language, B. Stroutstrup, 3rd Edition, Pearson Education 6. Programming in C++, Ashok N Kamthane. Pearson 4th 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

COURSE CODE			XBC206		L	T	P	C
COURSE NAME			Data Structures Lab		0	0	2	2
C	P	A			L	T	P	H
0	1	0			0	0	2	3
PREREQUISITE			Programming in C Lab					
Course outcomes:				Domain	Level			
CO1	Explain the creation , insertion and deletion elements			Psychomotor	Apply			
CO2	Describe the stack and queue operations			Psychomotor	Apply			
CO3	Explain creation of Binary tree			Psychomotor	Apply			
CO4	Describe sorting			Psychomotor	Apply			
CO5	Explain the Tree traversals.			Psychomotor	Apply			
Unit I Introduction					3 Hours			
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	3 Hours
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	**3 Hours**
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	**3 Hours**
1Write 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	**3 Hours**
1.Write and trace programs to Create a Binary search tree and insert and delete from the tree. 2.Represent a graph data structure and demonstrate operations of traversals on it.	

HOURS	Practical	TOTAL
	45	45

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

COURSE CODE			XBC207	L	T	P	C
COURSE NAME			Object oriented Programming Lab	0	0	2	2
C	P	A		L	T	P	H
0	1.5	0.5		0	0	2	3
PREREQUISITE			Programming in C Lab				
COURSE OUTCOMES:							

Course outcomes:		Domain	Level
CO1	**Explain** the creation , insertion and deletion of the elements	Psychomotor	**Apply**
CO2	**Describe** the stack and queue operations	Psychomotor	**Apply**
CO3	**Explain creation of Binary tree**	Psychomotor	**Apply**
CO4	**Describe** sorting	Psychomotor	**Apply**
CO5	**Explain** the Tree traversals.	Psychomotor	**Apply**

Unit I Introduction	**3 Hours**
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	**3 Hours**
1.Demonstration of array of object. 2.Using this pointer to return a value (return by reference).	
Unit III	**3 Hours**
1..Demonstration of virtual function. 2.Demonstration of static function	
Unit IV	**3 Hours**
1. Accessing a particular record in a student's file. 2. Demonstration of operator overloading.	
Unit V	**3 Hours**
1.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. 2.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.	

HOURS	Practical	TOTAL
	45	45

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

XUMA002			**ENVIRONMENTAL STUDIES**	L	T	P	SS
				1	0	0	0
C	P	A		L	T	P	SS
1.5	0	0.5		1	0	0	1

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*** the modern 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**

COURSE CODE	**XGE302**	**L**	**T**	**P**	**SS**	**H**	**C**
COURSENAME	**ENGLISH III**	**3**	**0**	**0**	**0**	**3**	**3**
C:P:A- 3:0:0							

COURSE OUTCOMES: **After the completion of course, the learners will be able to get comprehensive skills like:**		**Domain**	**Level**
CO1	***Broaden*** their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	Cognitive	Understand
CO2	Be ***updated*** with basic informatics skills and attitudes relevant to the emerging knowledge society	Cognitive	Apply
CO3	***Produce*** grammatically and idiomatically correct language.	Cognitive	Understand
CO4	***Gain*** knowledge in writing techniques to meet academic and professional needs.	Cognitive	Understand

CO5	Be ***equipped*** with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	Cognitive	Understand

SYLLABUS		**HOURS**
UNIT-I	**POETRY**	**6+3+0=9**
1.1 The Voice of the Mountains - Mamang Dai 1.2 Sita - Toru Dutt 1.3 A Song of Hope - Oodgeroo Noonuccal 1.4 In an Artist's Studio - Christina Rossetti		
UNIT-II	**SCENES FROM SHAKESPEARE**	**6+3+0=9**
2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene		
UNIT-III	**SPEECHES OF FAMOUS PERSONALITIES**	**6+3+0=9**
3.1 Tryst with Destiny- Jawaharlal Nehru 3.2 Yes, We Can-Barack Obama 3.3 You've Got to Find What You Love-Steve Jobs		
UNIT-IV	**LANGUAGE COMPETENCY**	**6+3+0=9**
4.1 Writing letters and emails 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram. facebook] 4.3 Learning netiquette, email etiquette		
UNIT - V	**ENGLISH FOR WORKPLACE**	**6+3+0=9**
5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used 5.4 Conducting and participating in a meeting		
L=30 / T=15	**Total Hours**	**45**

Tutorial Activities	
9) Reading and understanding incomplete texts 10) Summarize a piece of prose or poetry 11) Communication Practice 12) Role play	

- Stanley Wells et al. *The Shakespeare Book: Big Ideas Simply Explained*, DK Publishing, 2015
- Jeanne Kelly. *How to Build a Professional Digital Profile*. Kindle Edition, 2014
- Bernish, Bernish *Communications Associates, LLC*; 1st edition, 2012
- Keith S Folse, *Keys to Teaching Grammar to English Language Learners*, Second Ed.: A Practical Handbook by Michigan Teacher Training, 2016
- Practice Krysia. *Role Play-Theory and M Yardley-Matwiejczuk*, SAGE publications ltd, 2000
- In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio

XBC303			MULTIMEDIA SYSTEMS	L	T	P	ss	C
				2	0	0	0	2
C	P	A		L	T	P	ss	H
3	1	0		2	0	0	0	2

PREREQUISITE: Data Structure

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**	**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

UNIT II	**IMAGE EDITING –BASICS**	**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.		
UNIT III	**IMAGE AND TEXT EDITING- LAYERS**	**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		
UNIT IV	**IMAGE AND TEXT EDITING- EFFECTS**	**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		
UNIT V	**2D ANIMATION**	**6**
Exploring the 2D environment – working with images - basic drawing and selection – shapes – colour – text – layers – scene and frame label – symbol and instance – animation		

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

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.

REFERNCES

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,. "Computer Graphics: Principles & Practice", Pearson Education, Third 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.

E-REFERENCES

1. https://www.youtube.com/watch?v=ZGXS5HoBYAQ
2. https://www.youtube.com/watch?v=spoJ7Z8LzW8
3. www.tutorialspoint.com/listtutorials/multimedia/1

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

XBC304			OPERATING SYSTEM	L	T	P	SS	
				2	1	0	**0**	
C	**P**	**A**		**L**	**T**	**P**	**SS**	
4	0	0		2	1	0	0	

PREREQUISITE	**Data Structure**

Course Outcomes		**Domain**	**Level**
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**	**6+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**	**6+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**	**6+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**	**6+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**	**6+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**
30	**15**	0	**15**	**45+15**

Text book

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

E-References

4. NPTEL Evidence, 2009. *IISc Bangalore*. [Online] Available at:
5. http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html
6. 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

XBC305			**ALGORITHMS**	**L**	**T**	**P**	**SS**	**C**
				3	**0**	**0**	**0**	**3**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.8	**1**	**0.2**		3	**0**	**0**	**0**	**3**

PREREQUISITE: Data Structure and object oriented Programming

COURSE OUTCOMES		**Domain**	**Level**
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**

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

UNIT II	**SORTING AND SEARCHING TECHNIQUES**	**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.

UNIT III	**GRAPHS ALGORITHMS**	**9**

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

UNIT IV	**LOWER BOUNDING TECHNIQUES**	**9**

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

UNIT V	**ADVANCED ANALYSIS TECHNIQUE**	**9**

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

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

TEXT BOOKS:

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

REFERENCES:

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

E-REFERENCES:

6. www.tutorialspoint.com
7. www.nptel.com
8. www.virtuallab.ac.inLecture Slides,
9. Multiple Choice Questions, Animations Link:

http://highered.mheducation.com/sites/0072967757/student_view0/index.html

10. 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

XBC306			AUXILLARY PHYSICS	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	H
3	1	0		3	1	0	0	4

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

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

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**
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**
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**
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**	**0**	**0**	**75**

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

XBC308	AUILLARY PHYSICS LABORATORY	L	T	P	C
		0	0	1	1
C:P:A	0.5:1:0.5	L	T	P	H
PREREQUISITE	Nil	0	0	2	2

COURSE OUTCOMES On the successful completion of this course students would able to		Domain	Level
CO1	***Explain*** gates and ***demonstrate*** functions of various gate with truth table.	Psychomotor: Affective:	Analyze, Mechanism Respond
CO2	***Construct*** the regulator power supply and ***Measure*** the output voltage for changing input.	Cognitive Psychomotor	Evaluate
CO3	***Recall*** diodes, ***explain*** circuits and its characteristics	Psychomotor: Affective:	Analyze, Mechanism
CO4	***Construct*** simple circuits using logic gates.	Cognitive Psychomotor	Synthesis
CO5	***Know*** the concepts of semiconductor storage and function of flipflops.	Cognitive Psychomotor	Comprehension

Ex. No	Experiments (Any Eight Experiments)	
1.	Basic Logic gates IC's verification.	CO1
2.	Logic gates (AND, OR, NOT) – using discrete components	CO1
3.	Verification of De Morgan's theorem.	CO4
4.	Diode characteristics	CO3
5.	Voltage regulator power supply using full wave rectifier	CO2
6.	Half adder & Half subtractor using basic gate.	CO4
7.	NAND & NOR as Universal Logic gates.	CO1
8.	Full adder using basic gate.	CO3
9.	RS – Flip Flop	CO5
10.	JK – Flip Flop	CO5

	LECTURE	PRACTICAL	TOTAL
HOURS	0	30	30

XUMA003	DISASTER MANAGEMENT	L	T	P	SS	C
		1	0	0	0	1

C	P	A		L	T	P	SS	H

2.75	0	0.25		**1**	**0**	**0**	**0**	**1**

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	TOTAL
45	**-**	**-**	**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.ini

Mapping with Programme Outcomes

COs	**PO_1**	**PO_2**	**PO_3**	**PO_4**	**PO_5**	**PO_6**	**PO_7**	**PO_8**
CO_1	3	1		2	1	2	3	3
CO_2	3	1		2	1	2	3	2
CO_3	3	1		1	1	2	2	1
CO_4	3	1		2	1	2	3	2
	12	4		7	4	6	11	8
Scaled to 1, 2, 3	**3**	**1**		**2**	**1**	**2**	**3**	**2**

3 – Strong: 2 – Medium: 1 – Low

Mapping of CO with GA

Course outcomes	**GA1**	**GA2**	**GA3**	**GA4**	**GA5**	**GA6**	**GA7**	**GA8**	**GA9**	**GA10**	**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	**1**					**3**	**2**	**1**				**1**

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

PREREQUISITE: NIL

Course Outcomes		Domain	Level
CO1	Create a website using template	Cognitive	Remember Understand
CO2	Identify the styles to create website with frames and frame sets	Cognitive	Remember Understand
CO3	Demonstrate and Design with cascading style heets	Cognitive Psychomotor	Apply Set
CO4	Create online forms	Cognitive	Analyze Apply
CO5	Illustrate to publish and manage the websites	Psychomotor	Origination

UNIT I	**INTRODUCTION**	**3**
Introduction to Dreamweaver CS4, Working with Dreamweaver Websites.		
UNIT II	**CLASSES, OBJECTS AND METHODS**	**3**
Working with Web Pages, Working with HTML Tables, Framesets and Frames.		
UNIT III	**ARRAYS, INTERFACE AND PACKAGES**	**3**
Introduction to Cascading Style Sheets.		
UNIT IV	**MULTITHREADED PROGRAMMING**	**3**
Working with Templates, Working with Flash Contents and HTML Forms.		
UNIT V	**APPLET PROGRAMMING**	3
Working with JavaScript, Finalizing the Site.		

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

REFERENCES:

Dreamweaver CS4 in Simple Steps, Kogent Learning Solutions Inc,Dreamtech Press, 2018

COURSE CODE	XGE402	L	T	P	SS	H	C
COURSENAME	ENGLISH IV	3	0	0	0	3	3
C:P:A- 3:0:0							

COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:		Domain	Level
CO1	***Learn*** to communicate effectively and appropriately in real life situation.	Cognitive	Understand
CO2	***Use*** English effectively for study purpose across the curriculum	Cognitive	Apply
CO3	***Develop*** interest in and appreciation of Literature	Cognitive	Understand
CO4	***Develop*** and integrate the use of the four language skills	Cognitive	Understand

CO5	***Enhance*** their language skills especially in the areas of grammar and pronunciation.	Cognitive	Understand

SYLLABUS		**HOURS**
UNIT-I	**LIFE WRITING**	**6+3+0=9**
1.1 I am Malala-Malala Yousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2		
UNIT-II	**ONE ACT PLAY**	**6+3+0=9**
2.1 The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov		
UNIT-III	**INTERVIEWS**	**6+3+0=9**
Interviews 3.1 Nelson Mandela's Interview with Larry King. 3.2 Rakesh Sharma's Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)		
UNIT-IV	**LANGUAGE COMPETENCY**	**6+3+0=9**
4.1 Refuting, Arguing & Debating 4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice 4.3 Interviews (face to face, telephone and video conferencing)		
UNIT - V	**ENGLISH FOR WORKPLACE**	**6+3+0=9**
5.1 Job Applications: Covering letters, CV and Resume 5.2 Creating a digital profile - LinkedIn 5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card 5.4 Body Language -Practical Skills for Interviews.		
L=30 / T=15	**Total Hours**	**45**

Tutorial Activities

13) Reading and understanding incomplete texts
14) Summarize a piece of prose or poetry
15) Communication Practice
16) Role play

Text books:

- Borg, Taylor & Francis, *Writing Your Life: A Guide to Writing Autobiographies*, Mary 2021
- Colin Dolley , Rex Walfor. *The One-Act Play Companion: A Guide to plays, playwrights*, 2015
- Jeanne Kelly. *How to Build a Professional Digital Profile* Kindle Edition by Bernish, Bernish Communications Associates, LLC; 1st edition, 2012
- Tesla, Nikola. *My Inventions by Ingram* Short title, 2011
- Yousafzai, Malala. *I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban*, Christina Lamb , Little Brown, 2013

E-Resources:

- For Readers' Theatre:

https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s(the link to the performance; refer scripts by Aaron Sheperd) • http://BBC learn English.com • Nelson Mandela with Larry King • Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lkl.00.html	

XBC403			PROGRAMMING IN JAVA	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
3.5	0.5	0		3	0	0	0	3

PREREQUISITE: Object oriented and Programming

Course Outcomes		Domain	Level
CO1	***Recognize*** and ***Express*** the fundamentals of Data Base Management System and Relational database system	Cognitive	Remember Understand
CO2	***Recognize*** and ***Explain*** the Transaction 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
Fundamentals of Object-Oriented Programming – Java Evolution – Overview of Java Language – Constants, Variables and Data Types – Operators and Expressions – Decision Making and Branching – Decision Making and Looping		

UNIT II	CLASSES, OBJECTS AND METHODS	9
Introduction – Defining a Class – Adding Variables – Adding Methods – Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Finalizer Methods – Abstract Methods and Classes – Visibility Control		

UNIT III	ARRAYS, INTERFACE AND PACKAGES	9
Arrays - One-Dimensional Array – Creating an array – Two-Dimensional Array – Strings – Vectors – Wrapper Classes – Interfaces: Multiple Inheritance – Packages		

UNIT IV	MULTITHREADED PROGRAMMING	9
Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Synchronization – Implementing the 'Runnable' Interface – Managing Errors and Exceptions – Types of Errors – Exceptions – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions		

UNIT V	APPLET PROGRAMMING	9

Introduction – Applet Life Cycle – Creating an Executable Applet – Designing a Web Page – Applet Tag – Adding Applet to HTML File – Running the Applet – Passing Parameters to Applets – Getting Input from the User - Abstract Windowing Toolkit				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
45	**0**	**0**	**15**	**45+15**

REFERENCES:

6. Bruce Eckel, Thinking in Java (4th edition) Herbert Schildt,
7. Java: The Complete Reference (9th edition)
8. Y. Daniel Liang, Introduction to Java Programming (10th edition)
9. Paul Deitel, Harvey Deitel, Java: How To Program (10th edition)
10. Cay S. Horsttnann, Core Java Volume I –Fundamentals (10th edition)

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

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

XBC404			DATA BASE MANAGEMENT SYSTEMS	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
3	1	0		3	0	0	0	3

PREREQUISITE: Operating System

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*** the Transaction 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**

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.

UNIT II	**RELATIONAL DATABASES**	**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.

UNIT III	**DATABASE DESIGN**	**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.

UNIT IV	**TRANSACTION MANAGEMENT**	**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.

UNIT V	**IMPLEMENTATION TECHNIQUES**	**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.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	**0**	**0**	**15**	**45+15**

Text Books:

5. Raghu Ramakrishnan., 2010. “Database Management Systems”, Fourth Edition, Tata McGraw Hill.
6. G.K.Gupta, 2011.”Database Management Systems”, Tata McGraw Hill.

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.

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

XBC405			STATISTICS	L	T	P	SS	C
				3	1	0	1	5
C	P	A		L	T	P	SS	H
3.0	0.5	0.5		3	1	0	1	5

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 Understanding	Applying
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	GA 10
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

XBC406			PRINCIPLES OF MANAGEMENT	L	T	P	S S	C
				3	0	0	0	3
C	P	A		L	T	P	S S	H
3	0.5	0.5		3	0	0	0	3

PREREQUISITE: NIL

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*** he principles of management concept in day to day activities.	Cognitive Psychomotor	Create Set

UNIT I	**OVERVIEW OF MANAGEMENT**	**9**

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**	**9**

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**	**9**

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**	**9**

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**	**9**

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
45	0	--	15	45+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

COURSE CODE			XBC407	L	T	P	C
COURSE NAME			Programming in Java Lab	0	0	1	1
C	P	A		L	T	P	H
0	1	0		0	0	1	2
PREREQUISITE			Object oriented programming Lab				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Explain** the Control Statements	Psychomotor	**Apply**
CO2	**Illustrate** constructors, Method overloading and overriding	Psychomotor	**Apply**
CO3	**Apply** arrays ,strings, Interfaces and packages	Psychomotor	**Apply**

CO4	**Illustrate** Multi Threading and Exception Handling	Psychomotor	**Apply**
CO5	**Construct** an applet programming and event Handling	Psychomotor	**Apply**
Unit I			**2 Hours**
1. Simple Java Programs 2.Decision Making, Branching and Looping			
Unit II			**2 Hours**
1.Constructors and Method Overloading 2.Inheritance and Method Overriding			
Unit III			**2 Hours**
1.Arrays and Strings 2.Interfaces and Packages			
Unit IV			**2 Hours**
1.Multi Threading 2.Exception Handling			
Unit V			**2 Hours**
1.Applet Programming 2. Event Handling			
HOURS	**Practical**		**TOTAL**
	30		**30**

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

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

COURSE CODE			**XBC408**	**L**	**T**	**P**	**C**
COURSE NAME			**DBMS Lab**	**0**	**0**	**1**	**1**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1**	**0**		**0**	**0**	**1**	**2**
PREREQUISITE			Nil				
Course outcomes:				**Domain**	**Level**		

CO1	**Explain the keys and identify strong entity and weak entity.**	Psychomotor	**Apply**
CO2	**Illustrate Normalization**	Psychomotor	**Apply**
CO3	**Apply DML Comments**	Psychomotor	**Apply**
CO4	**Illustrate aggregate functions**	Psychomotor	**Apply**
CO5	**Illustrate Triggers**	Psychomotor	**Apply**

Unit I	**2 Hours**

1: E-R Model

Analyse 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	**2 Hours**

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	**2 Hours**

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	**2 Hours**

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	**2 Hours**

10: Triggers

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

HOURS	Practical	TOTAL
	30	30

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

XUMA004			INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT	L	T	P	SS	C
				1	0	0	0	1
C	P	A		L	T	P	SS	H
2.5	0	0.5		1	0	0	1	2

PREREQUISITE : Nil

Course Outcome		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** and ***describe*** the personal traits of an entrepreneur.	Affective Cognitive	Receiving Understand
CO2	***Determine*** the new venture ideas and ***analyze*** the feasibility report.	Cognitive	Understand Analyse
CO3	***Develop*** the business plan and ***analyze*** the plan as an individual or in team.	Affective Cognitive	Receiving Analyse
CO4	***Describe*** various parameters to be taken into consideration for launching and managing small business.	Cognitive	Understand
CO5	***Describe*** Technological management and Intellectual Property Rights	Cognitive	Understand

UNIT I	ENTREPRENEURIAL TRAITS AND FUNCTIONS	
Definition of Entrepreneurship; competencies and traits of an entrepreneur; factors affecting Entrepreneurship Development; Role of Family and Society ; Achievement Motivation;		

Entrepreneurship as a career and national development;		
UNIT II	**NEW PRODUCT DEVELOPMENT AND VENTURE CREATION**	
Ideation to Concept development; Sources and Criteria for Selection of Product; market assessment ; Feasibility Report ;Project Profile; processes involved in starting a new venture; legal formalities; Ownership; Case Study.		
UNIT III	**ENTREPRENEURIAL FINANCE**	
Financial forecasting for a new venture; Finance mobilization; Business plan preparation; Sources of Financing, Angel Investors and Venture Capital; Government support in startup promotion.		
UNIT IV	**LAUNCHING OF SMALL BUSINESS AND ITS MANGEMENT**	
Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units.		
UNIT V	**TECHNOLOGY MANAGEMENT, IPR PORTFOLIO FOR NEW PRODUCT VENTURE**	**9**
Technology management; Impact of technology on society and business; Role of Government in supporting Technology Development and IPR protection; Entrepreneurship Development Training and Other Support Services.		

Lecture	Tutorial	Practical	Self Study	Total
15	**0**	**0**	**15**	**15 + 15**

TEXTBOOKS:

3. Hisrich, 2016, *Entrepreneurship*, Tata McGraw Hill, New Delhi.
4. S.S.Khanka, 2013, *Entrepreneurial Development*, S.Chand and Company Limited, New Delhi.

REFERENCES

6. Mathew Manimala, 2005, *Entrepreneurship Theory at the Crossroads, Paradigms & Praxis*,Biztrantra ,2nd Edition.
7. Prasanna Chandra, 2009, *Projects – Planning, Analysis, Selection, Implementation and Reviews*, Tata McGraw-Hill.
8. P.Saravanavel, 1997, *Entrepreneurial Development*, Ess Pee kay Publishing House, Chennai.
9. Arya Kumar,2012, *Entrepreneurship: Creating and Leading an Entrepreneurial Organisation*, Pearson Education India.
10. Donald F Kuratko, T.V Rao, 2012, *Entrepreneurship: A South Asian perspective*, Cengage Learning India.

E-REFERENCES

4. Dinesh Awasthi, Raman Jaggi, V.Padmanand, *Suggested Reading / Reference Material*

for Entrepreneurship Development Programmes (EDP/WEDP/TEDP), EDI Publication, Entrepreneurship Development Institute of India, Ahmedabad. Available from: http://www.ediindia.org/doc/EDP-TEDP.pdf
5. Jeff Hawkins, " Characteristics of a successful entrepreneur", ALISON Online entrepreneurship courses, "https://alison.com/learn/entrepreneurial-skills
6. Jeff Cornwall, "Entrepreneurship -- From Idea to Launch", Udemy online Education, https://www.udemy.com/entrepreneurship-from-idea-to-launch/

XBC409			ONLINE CONTENT CREATION	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		Domain	Level
After the completion of the course, students will be able to			
CO1:	***Recognize*** the fundamentals and techniques of online content creation	Cognitive	Remember
CO2:	***Express*** the knowledge on file upload in ICT Tools.	Cognitive Psychomotor	Understand Guided Response

Introduction to online content creation-Types of content-Current trends in online content creation-Content Planning and Strategy-Creating a content calendar and workflow-Understanding content formats and their suitability-Introduction to graphic design and image editing tools-Video creation and editing basics-Recording and editing video content-Understanding various social media platforms-Strategies for promoting content on different platforms-Emerging Trends in Online Content Creation.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
15	0	0	0	15

TEXTBOOKS

3. How to Build Word of Mouth in the Digital Age" by Jonah Berger

REFERENCES

2. The Content Formula: Calculate the ROI of Content Marketing and Never Waste Money Again&quote; byMichael Brenner and Liz Bedor
3. Everybody Writes: Your Go-To Guide to Creating Ridiculously Good Content &quote; by Ann Handley

XBC501A			MATLAB PROGRAMMING	L	T	P	SS
				3	1	0	0
C	P	A		L	T	P	SS

3	**0**	**0.5**		3	1	**0**	0
Prerequisite			**Programming in Java**				

Course Outcome		**Domain**	**Level**
CO1	***Recognize*** the fundaments of procedural and functional programming.	Cognitive	Remember
CO2	***Express*** the functionalities of Matlab data types and structures	Cognitive	Understand
CO3	***Describe*** the concepts and guidelines of Be able to set up simple real-life numerical problems such that they can be solved and visualized using basic codes in Matlab.	Cognitive	Understand
CO4	Actively ***Participate*** in ***Choosing*** the appropriate techniques and methods for the real time applications as a team.	Affective Cognitive	Response Apply
CO5	***Analyze*** the techniques used in the various stages of Software Engineering.	Cognitive	Analyze

UNIT I	**INTRODUCTION TO MATLAB**	**9+3**

Introduction to MATLAB Programming- Basics of MATLAB programming, Array operations in MATLAB, Loops and execution control, working with files: Scripts and Functions, Plotting and program output.

UNIT II	**APPROXIMATIONS AND ERRORS**	**9+3**

Approximations and Errors- Defining errors and precision in numerical methods, Truncation and round-off errors, Error propagation, Global and local truncation errors.

UNIT III	**LINEAR EQUATIONS**	**9+3**

Linear Equations- Linear algebra in MATLAB, Gauss Elimination, LU decomposition and partial pivoting, Iterative methods: Gauss Siedel Method

UNIT IV	**REGRESSION AND INTERPOLATION**	**9+3**

Regression and Interpolation- Introduction, Linear least squares regression (including lsqcurvefit function), Functional and nonlinear regression (including lsqnonlin function), Interpolation in MATLAB using spline and pchip.

UNIT V	**NON - LINEAR EQUATIONS**	**9+3**

Nonlinear Equations- Nonlinear equations insingle variable, MATLABfunction fzero in single variable, Fixed-point iteration insingle variable, Newton- Raphson in single variable, MATLAB function fsolve in single and multiple variables, Newton-Raphson in multiple variables.

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

TEXT BOOKS:

3. Fausett L.V.(2007) Applied Numerical Analysis Using MATLAB, 2nd Ed., Pearson Education
4. Essential MATLAB for Engineers and Scientists, 6th Edition, Brian Hahn; Daniel T. Valentine, Academic Press, Web ISBN -13: 978-0-12-805271-6,

REFERENCES:

5. Roger. S. Pressman, Software Engineering A Practitioner's Approach, Sixth Edition, Tata McGraw Hill Higher Education, 2010.
6. Ian Sommerville, Software Engineering, Ninth Edition, Pearson Education Inc., 2012.

E-REFERENCES:

9. http://www.rspa.com/spi/
10. https://www.wiziq.com/tutorials/software-engineering
11. http://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm
12. https://www.tutorialspoint.com/software_engineering/software_engineering_tutorial.pdf

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	2	1	1	1	1	2
CO2	3	1	3	2	1	1	1	1	2
CO3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	1	1	1	2	2
CO5	2	2	2	2	2	1	1	2	1
Average	2	2	2	2	1	1	1	1	2

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

XBC501B			FUNDAMENTALS OF R PROGRAMMING	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	H
0.5	0.4	0.1		3	1	0	0	4

PREREQUISITE: Programming in Java

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
CO4	Understands the loading, retrieval techniques of data	Cognitive Psychomotor Affective	Apply Set Respond
CO5	Compile and Visualize statistical Functions	Cognitive Psychomotor	Apply Set

UNIT-I	9+3
Introduction to R:What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed.packages(), package Description(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and –inf.	
UNIT-II	**9+3**
R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame – R – Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables – R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators – R Decision Making: if statement, if – else statement, if – else if statement, switch statement – R Loops: repeat loop, while loop, for loop – Loop control statement: break statement, next statement.	
UNIT-III	**9+3**
R-Function : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values - R-Strings – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower() - R Vectors – Sequence vector, rep function, vector access, vector names, vector math, vector recycling, vector element sorting - R List - Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector - R Matrices – Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division- R Arrays: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements - R Factors – creating factors, generating factor levels gl().	
UNIT-IV	**9+3**
Data Frames –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions – Extract Data from Data Frame, Expand Data Frame: Add Column, Add Row – Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast(). Loading and handling Data in R: Getting and Setting the Working Directory – getwd(), setwd(), dir() – R-CSV Files – Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() – Writing into a CSV File – R –Excel File – Reading the Excel file.	
UNIT-V	**9+3**
Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode - Standard Deviation – Correlation - Spotting Problems in Data with Visualization: visually Checking Distributions for a single Variable - R – Pie Charts: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart – R Histograms – Density Plot - R – Bar Charts: Bar Chart Labels, Title and Colors.	

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	15	0	0	60

TEXT BOOKS:

1.Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN : 978-93-5260-455-5.

REFERENCES:

1.. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN: 978-93-5260-

524-8.
2. Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), R Programming, Retrieved from https://www.tutorialspoint.com/r/r_tutorial.pdf.
3 Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN: 978-1-119-05580-8

E-REFERENCES:

http://www.rspa.com/spi/
http://www.tutorialride.com
http://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	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

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

PREREQUISITE: Programming in java

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+3

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, Tuple Assignment, Precedence of Operators, Comments; Modules and Functions, Function Definition and use, Flow

of Execution, Parameters and Arguments.		
UNIT II	**OPERATORS IN PYTHON**	**9+3**
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.		
UNIT III	**ARRAYS IN PYTHON**	**9+3**
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.		
UNIT IV	**FUNCTIONS**	**9+3**
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 and Methods; Advanced List Processing - List Comprehension; Illustrative Programs: Selection Sort, Insertion Sort, Merge sort, Histogram..		
UNIT V	**FILES AND EXCEPTION**	**9+3**
Files and Exception: Text Files, Reading and Writing Files, Format Operator; Command Line Arguments, Errors and Exceptions, Handling Exceptions, Modules, Packages; Illustrative Programs: Word Count, Copy File.		

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	15	0	0	60

TEXTBOOKS:

4. Mark Lutz, Learning Python
5. Tony Gaddis, starting out with Python
6. 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

XBC502A			SOFTWARE ENGINEERING	L	T	P	ss	C
				3	1	**0**	0	4
C	P	A		L	T	P	ss	H

2.9	**0**	**0.1**		**3**	1	0	0	**4**

Prerequisite	**Operating System**

	Course Outcome	**Domain**	**Level**
CO1	***Recognize*** the significance of entire Software Engineering process.	Cognitive	Remember
CO2	***Express*** the functionalities of Cost Estimation and Requirement Specification Techniques.	Cognitive	Understand
CO3	***Describe*** the concepts and guidelines of Software Design, Coding, Testing and Maintenance.	Cognitive	Understand
CO4	Actively ***Participate*** in ***Choosing*** the appropriate techniques and methods for the real time applications as a team.	Affective Cognitive	Response Apply
CO5	***Analyze*** the techniques used in the various stages of Software Engineering.	Cognitive	Analyze

UNIT I	**INTRODUCTION AND PLANNING A SOFTWARE PROJECT**	**9+3**

Introduction - Definitions – Size Factors – Quality and Productivity factors – Managerial Issues.Planning a Software Project – Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.

UNIT II	**COST ESTIMATION AND REQUIREMENTS SPECIFICATION**	**9+3**

Software Cost Estimation – Cost Factors – Cost Estimation Techniques – Staffing – Level Estimation – Estimating Software Maintenance Costs.Software Requirements Definition – Software Requirement Specification – Formal Specification Techniques – Language and Processors for Requirements.

UNIT III	**SOFTWARE DESIGN**	**9+3**

Software Design – Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real Time and Distributed System design – Test Plans – Milestones, Walkthroughs and Inspections – Design Guidelines.

UNIT IV	**IMPLEMENTATION**	**9+3**

Implementation Issues – Structured Coding Techniques – Coding Style – Standard and Guidelines – Documentation guidelines – Data Abstraction – Exception Handling – Concurrency Mechanisms.

UNIT V	**TESTING AND MAINTENANCE**	**9+3**

Verification and Validation Techniques – Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification. Software Maintenance – Enhancing Maintainability during Development – Managerial aspects – Configuration Management – Source Code Metrics – Other Maintenance Tools and Techniques.

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
45	**15**	**0**	**0**	**60**

TEXT BOOKS:

Richard E.Fairley, Software Engineering Concepts, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.

REFERENCES:

7. Roger.S.Pressman, Software Engineering A Practitioner's Approach, Sixth Edition, Tata McGraw Hill

Higher Education, 2010.
8. Ian Sommerville, Software Engineering, Ninth Edition, Pearson Education Inc., 2012.

WEBSITES:

13. http://www.rspa.com/spi/
14. https://www.wiziq.com/tutorials/software-engineering
15. http://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm
16. https://www.tutorialspoint.com/software_engineering/software_engineering_tutorial.pdf

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	2	1	1	1	1	2
CO2	3	1	3	2	1	1	1	1	2
CO3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	1	1	1	2	2
CO5	2	2	2	2	2	1	1	2	1
Average	2	2	2	2	1	1	1	1	2

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

XBC502B			COMPUTER ETHICS	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	H
2.5	0.5	0		3	1	0	0	4

PREREQUISITE: Principles of Management

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

Course Outcome		Domain	Level
CO1	***State*** the basics of graphics and ***identify*** how they can be used in computer.	Cognitive	Knowledge, Analyse
CO2	***Recall*** and ***distinguish*** the various 2-D Geometrical transforms and their applications.	Cognitive	Knowledge, Comprehension
CO3	***Explain*** the basic elements of **3**-D Object representation, and ***identify*** various 3D transformation techniques	Cognitive	Comprehension, Analysis
CO4	***Know*** about visible surface detection methods	Cognitive	Knowledge
CO5	**Construct** various computer animation methods and **choose** animation for an application.	Psychomotor	Perception, Set

UNIT - I	Introduction	9+3

The Need for Computer Ethics Training and Historical Milestones.

UNIT - II	Computer Ethics	9+3

Defining the Field of Computer Ethics, Computer ethics codes, Sample Topics in Computer Ethics i.Computer crime and computer security ii. Software theft and intellectual property rights iii. Computer

hacking and the creation of viruses iv. Computer and information system failure v.Invasion of privacy. Privacy in the Workplace and on the Internet vi.Social implications of artificial intelligence and expert systems vii. The information technology salesman issues.		
UNIT - III	**Transparency**	**9+3**
Transparency and Virtual Ethics, Free Speech, Democracy, Information Access.		
UNIT - IV	**Developing the Ethical Analysis**	**9+3**
Developing the Ethical Analysis Skills and Professional Values, Privacy, Accountability, Government Surveillance.		
UNIT - V	**Boundaries of Trust**	**9+3**
Boundaries of Trust, Trust Management, Wikipedia, Virtual Trust, Plagiarism in Online Environment, Intellectual Property, Net neutrality		

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	15	0	0	60

TEXT BOOKS:

3. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.
4. "Computer Graphics Second edition", Zhigandxiang, Roy Plastock, Schaum's outlines, Tata McGraw hill edition.

REFERENCE BOOKS:

4. Deborah, J, Nissenbaun, H, Computing, Ethics & Social Values, Englewod Cliffs, New Jersey, Prentice Hall, 1995.
5. Spinello, R, Tavani, H, T, Readings in Cyberethics, Sudbury, MA, Jones and Bartlett Publishers, 2001.
6. Bynum,T, W; Rogerson, S, Computer Ethics and Professional Responsibility, Blackwell, 2004

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	2	1	1	1	1	2
CO2	3	1	3	2	1	1	1	1	2
CO3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	1	1	1	2	2
CO5	2	2	2	2	2	1	1	2	1
Average	2	2	2	2	1	1	1	1	2

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

XBC502C	COMPUTER ORGANIZATION & ARCHITECTURE	L	T	P	S	C

							S	
			3	1	0	0	4	
C	P	A	L	T	P	SS	H	
3	0	0	3	1	0	0	4	

PREREQUISITE: Nil

Course Outcomes		Domain	Level
CO1	***Recognize*** the operation of functional units of a computer	Cognitive Psychomotor	Knowledge
CO2	***Describe*** the computational operation of hardware units associated with a computing device.	Cognitive	Comprehension
CO3	***Demonstrate*** the operation of processing unit.	Cognitive Psychomotor	Application
CO4	***Compare*** the performance of different types of memory	Cognitive	Analyze
CO5	***Recognize*** the operation of interfacing devices.	Cognitive	Knowledge

UNIT I	BASIC STRUCTURE OF COMPUTERS	9+3

Functional Units - Bus Structures - Performance - Evolution - Machine Instructions and programs - Memory operations - Instruction and instruction sequencing - addressing modes - Basic I/O operations - stacks and queues - subroutines - Encoding of Machine instructions.

UNIT II	ARITHMETIC UNIT	9+3

Arithmetic - Design of fast adders - Binary Multiplication - Division - Floating point numbers and operations.

UNIT III	BASIC PROCESSING UNIT	9+3

Processing unit - Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control – Micro programmed control - pipelining - Basic concepts - Hazards - Inference on instruction sets. Data path and control considerations - Performance issues.

UNIT IV	MEMORY SYSTEM	9+3

RAM and ROM - Cache memories - Performance considerations - Virtual memories – secondary storage devices - Associative memories.

UNIT V	INPUT / OUTPUT ORGANIZATION	9+3

Accessing I/O devices - Interrupts - DMA - Buses - Interface circuits - standard I/O Interfaces. Case study of one RISC and one CISC processor.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	15	0	0	60

TEXT BOOKS

3. Carl Hamacher, ZvonkoUranesic, SafvatZaby., 2002. “Computer Organisation”, 5th edition, McGraw Hill.
4. John P Hayes, “Computer Architecture and Organisation”, 3rd edition, McGraw Hill .

REFERENCES

2. David A Patterson and John L. Hennessy, 2002. “ Computer Organization and Design The Hardware / Software Interface”, 2nd edition, Harcourt Asia, Morgan Kaufmann.

E-REFERENCE
3. www.**tutorials**point.com/**computer**_logical_**organization**/ 4. **nptel**.ac.in/courses/106106092/

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 relation

XBC502D			**COMPUTER NETWORKS**	**L**	**T**	**P**	**C**
				3	**1**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**H**
2.8	**0**	**0.2**		**3**	**1**	**0**	**4**

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*** the protocol 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**	**9+3**
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**	**9+3**
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**	**9+3**
Introduction to Network Layer – Network Layer Protocols – Unicast Routing – Multicast Routing.		
UNIT IV	**TRANSPORT LAYER**	**9+3**
Introduction to Transport Layer – Transport Layer Protocols – User Datagram Protocol – Transmission Control Protocol – SCTP.		
UNIT V	**APPLICATION LAYER AND SECURITY**	**9+3**
Introduction to Application Layer – Standard Client Server Protocols – Multimedia – WWW and HTTP – FTP – Electronic Mail – TELNET – DNS.		

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

TEXT BOOKS:

2. Behrouz A.Forouzan, "Data Communications and Networking", Fifth Edition, McGraw Hill Education, 2013.

REFERENCES:

4. Achyut S Godbole, Atul Hahate, "Data Communications and Networks", Second Edition, New Delhi: Tata McGraw-Hill Education, 2011.
5. Andrew S. Tanenbaum, David J. Wetherall "Computer Networks", Fifth Edition, Pearson Education Inc., 2013.
6. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2014.

E-REFERENCES

4. Video Lecture Link: http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html
5. Lecture Slides, Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
6. 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	1	0	0	4
C	P	A		L	T	P	SS	H
2.8	1	0.2		3	1	0	0	4

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+3**

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

UNIT II	**INTRODUCTION TO C#.NET**	**9+3**

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.

UNIT III	**APPLICATION DEVELOPMENT USING ADO .NET**	**9+3**

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.

UNIT IV	**INTRODUCTION TO ASP.NET**	**9+3**

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.				
UNIT V	**APPLICATIONS OF ASP.NET WITH C#**			**9+3**
Windows Application: Creation of Media Player. Web Applications: Job Portal, E-mail and SMS Server, Online food ordering System.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
45	**15**	**0**	**0**	**60**

TEXTBOOKS

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

REFERENCES

8. Herbert Schildt, "C# 4.0 The Complete Reference", McGraw-Hill Education, 2010.
9. 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

10. www.tutorialspoint.com
11. 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

XBC503B			**GIMP(GNU IMAGE MANIPULATION PROGRAM)**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**0**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.5	**0.5**	**0**		**3**	**1**	**0**	**0**	**4**

PREREQUISITE: Nil

Course Outcomes	**Domain**	**Level**

After the completion of the course, students will be able to			
CO1	***Recognize*** the importance of Imaging Concepts and Graphic Formats.	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the functionalities of each Capturing and Creating Images.	Cognitive	Understand
CO3	***Employ*** the understanding of the various Grid Properties.	Cognitive	Apply
CO4	***Utilize*** the Image Manipulations.	Cognitive	Apply
CO5	***Design*** and ***Establish*** the Creating and Drawing tools.	Cognitive Psychomotor	Create Set
UNIT I			**9+3**
Imaging Concepts and Graphic Formats: Pixel, Resolution, File Size, Image Compression, Raster & Vector Images, Color Model.			
UNIT II			**9+3**
Capturing and Creating Images: Saving Images, Scanning Images, Familiarization with GIMP Interface.			
UNIT III			**9+3**
Settings: Foreground and Background Colors, Grid Properties.			
UNIT IV			**9+3**
Image Manipulations: Resizing images, cropping images, Moving and Copying images, Rotating and flipping images.			
UNIT V			**9+3**
Working with Text: Creating and editing text, Formatting Text, Applying text wraps. Tools: Drawing tools, Painting tools			

LECTURE	TUTORIAL	PRACTICAL	SELF - STUDY	TOTAL
45	**15**	**0**	**0**	**60**

REFERENCES:

1. Kay Richter, GIMP 2.8 - Buch (e-book)
2. Olivier Lecarme and KarineDelvare, The Book of GIMP, A complete Guide to Nearly Everything, Kindle Edition

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	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
Averge	2	3	3	3	3	1	1	3	2

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

XBC503C			THEORY OF COMPUTATION	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	C
2.5	0.5	0		3	1	0	0	4

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 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	**9+3**
Automata: Introduction to Formal Proof, Additional Forms of Proof, InductiveProofs, FiniteAutomata (FA), Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Finite Automata with Epsilon Transitions. **Lab:** Language of Binary strings which ends with the pattern 101.	

UNIT II	**9+3**
Regular Expressions and Languages: Regular Expression, FA and Regular Expressions, Proving Languages not to be Regular, Closure Properties of Regular Languages, Equivalence and Minimization of Automata.	

UNIT III	**9+3**
Context Free Grammars and Languages: Context Free Grammar (CFG), Parse Trees, Ambiguity in Grammars and Languages, Definition of The Pushdown Automata, Languages of a Pushdown Automata, Equivalence of Pushdown Automata and CFG Deterministic Pushdown Automata.	

UNIT IV	**9+3**
Properties of Context Free Languages: Normal Forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, Programming Techniques for TM, Variations of TM, Non-Universal TM, Universal TM.	

UNIT V	**9+3**
Undecidability: A Language that is not Recursively Enumerable (RE), an Undecidable	

Problem that is RE, Undecidable Problems about Turing Machine, Post's Correspondence Problem, The Classes P and NP.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
45	**15**	**0**	**0**	**60**
TEXT BOOKS:				
3. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007. 4. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.				

Table 1: Mapping of COs with Pos

Course Outcomes	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	0	1	1	0	1	0	1	2
CO2	2	2	2	1	1	0	1	2	3
CO3	1	2	2	1	2	1	1	2	3
CO4	0	1	2	2	2	1	0	2	3
CO5	1	2	3	2	3	2	1	3	3
Average	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**3**

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

XBC504A			**IMAGE PROCESSING**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**0**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.5	**0.5**	**0**		**3**	**1**	**0**	**0**	**4**

PREREQUISITE: Multimedia System

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance image fundamentals and mathematical transforms necessary for image processing.	Cognitive	Remember
CO2	***Express*** the knowledge on image enhancement techniques	Cognitive	Understand
CO3	***Employ*** and understand the image restoration and reconstruction procedures	Cognitive	Apply
CO4	***Utilize*** and exploit the image segmentation procedures.	Cognitive	Apply

CO5	***Recognize*** the color models.	Cognitive	Create

UNIT I	**DIGITAL IMAGE FUNDAMENTALS**	**9+3**

Digital Image Fundamentals: Elements of Visual Perception, Light, Brightness Adaption and Discrimination, Image Sensing and Acquisition, Image Sampling and Quantization, Pixels, Some Basic Relationships between Pixels, Coordinate Conventions, Imaging Geometry, Perspective Projection, Linear and Nonlinear Operations.

UNIT II	**IMAGE ENHANCEMENT**	**9+3**

Image Enhancement in the Spatial Domain: Intensity transformations, Contrast Stretching, Histogram Equalization, Correlation and Convolution, Basics of Spatial Filtering, Smoothing Filters, Sharpening Filters, Gradient and Laplacian.

UNIT III	**FILTERING IN THE FREQUENCY DOMAIN**	**9+3**

Filtering in the Frequency domain: Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2 -D sampling, Discrete Cosine Transform, Frequency domain filtering.

UNIT IV	**IMAGE RESTORATION AND RECONSTRUCTION**	**9+3**

Image Restoration and Reconstruction: Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from projections.

UNIT V	**COLOR IMAGE PROCESSING**	**9+3**

Color Image Processing, Color Fundamentals, Color Models, Pseudo color Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation. Morphological Image Processing, Dilation and Erosion, Opening and Closing., Extensions to Gray -Scale Images. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Segmentation by Morphological Watersheds.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	**15**	**0**	**0**	**60**

TEXT BOOKS:

3. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, 4th Edition, Prentice Hall.

REFERENCES:

1. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall.
4. Stan Birchfield, Image Processing and Analysis, Cengage Learning.

E-REFERENCES:

https://www.tutorialspoint.com/image processing/

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

XBC504B			**INTERNET TECHNOLOGIES**	**L**	**T**	**P**	**SS**	**C**
				3	**1**	**0**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2.5	**0.5**	**0**		**3**	**1**	**0**	**0**	**4**

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**	**9+3**

Introduction: Overview, Network of Networks, Intranet, Extranet and Internet. World Wide Web, Domain and Sub 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**	**9+3**

IP Datagram, IPv4 and IPv6. IP Subnetting and addressing: Classful and Classless Addressing, Subnetting. NAT, IP masquerading, IP tables. Internet Routing Protocol: Routing -Intra and Inter Domain Routing, Unicast and Multicast Routing, Broadcast. Electronic Mail: POP3, SMTP.

UNIT III	**HTML INTRODUCTION**	**9+3**

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**	**9+3**
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**	**9+3**
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
45	15	0	0	60

REFERENCES:

3. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI, Learning, Delhi, 2013.
4. 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

XBC504C			SYSTEM SECURITY	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	H
3	0	0		3	1	0	0	4

PREREQUISITE: Computer Networks

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Understand*** computer operating systems, distributed systems, networks and representative applications.	Cognitive	Remember
CO2	***Identify the*** distributed system attacks, defences against them, and forensics to investigate the aftermath	Cognitive	Remember
CO3	***Analyze*** the basics of cryptography, how it has evolved, and some key encryption techniques used today.	Cognitive	Analyze
CO4	***Recognize*** the security policies.	Cognitive	Remember
CO5	***Analyze*** the malicious software and DOS attacks.	Cognitive	Analyze

UNIT I	CRYTOGRAHIC TOOLS	9+3

Cryptographic Tools- Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers, Practical Application: Encryption of Stored Data.

UNIT II	USER AUTHENTICATION	9+3

User Authentication- Means of Authentication, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, RemoteUser Authentication, Security Issues for User Authentication, Practical Application: An Iris Biometric System, Case Study: Security Problems for ATM Systems.

UNIT III	ACCESS CONTROL	9+3

Access Control- Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control, Example: UNIX File Access Control, Role - Based Access Control, Case Study: RBAC System for a Bank.

UNIT IV	DATABASE SECURITY	9+3

Database Security-The Need for Database Security, Database Management Systems, Relational Databases, Database Access Control, Inference, Statistical Databases, Database Encryption, Cloud Security.

UNIT V	MALICIOUS SOFTWARE	9+3

Malicious Software-Types of Malicious Software (Malware), Propagation– Infected Content–Viruses, Propagation–Vulnerability Exploit–Worms, Propagation–Social Engineering–SPAM E-mail, Trojans, Payload–System Corruption, Payload–Attack Agent–Zombie, Bots, Payload–Information Theft– Key loggers, Phishing, Spyware, Payload–Stealthing–Backdoors, Rootkits,, Counter measures, Denial-of-Service Attacks- Denial-of-Service Attacks, Flooding Attacks, Distributed Denial-of-Service Attacks, Application-Based Bandwidth Attacks, Reflector and Amplifier Attacks, Defenses Against Denial -of-Service Attacks,

Responding to a Denial-of-Service Attack.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**15**	**0**	**0**	**60**

TEXTBOOKS:

5. M. Stamp, "Information Security: Principles and Practice," 2 st Edition, Wiley, ISBN: 0470626399, 2011.
6. M. E. Whitman and H. J. Mattord, "Principles of Information Security," 4 st Edition, Course Technology, ISBN: 1111138214, 2011.
7. M. Bishop, "Computer Security: Art and Science," Addison Wesley, ISBN: 0 -201-44099-7, 2002.
8. G. McGraw, "Software Security: Building Security In," Addison Wesley, ISBN: 0321356705, 2006

REFERENCES:

5. David J. Kruglinski, Inside Visual C++, Microsoft Press 1992.
6. Boar, B.H., Implementing Client / Server Computing ; A Strategic Perspectre, Mcraw Hill, 1993.
7. Bouce Elbert, Client / Server Computing, Artech. Press, 1994.
8. Alex Berson, Client / Server Architecture, McGraw Hill, 1996.

E-REFERENCES:

fivedots.coe.psu.ac.th/~suthon/csw/01%20-%20Client%20Server%20Computing.pdf
www.bcanotes.com/Download/DBMS/Rdbms/Client_Server%20Computing.pdf

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	1	2	1	1	1	1	2	1
CO2	1	2	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	1	3	2	1	1	2	1	1
Average	1	1	2	1	1	1	1	2	1

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

COURSE CODE			XBC505A	**L**	**T**	**P**	**C**
COURSE NAME			MATLAB Programming Lab	**0**	**0**	**2**	**2**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1**	**0**		**0**	**0**	**2**	**3**
PREREQUISITE			Java Programming lab				

COURSE OUTCOMES:

Course outcomes:		**Domain**	**Level**
CO1	**Explain** the arithmetic operations	Psychomotor	**Apply**
CO2	**Describe** Functions and Plotting	Psychomotor	**Apply**

CO3	**Apply Linear Equations**	Psychomotor	**Apply**
CO4	**Describe** Linear regression	Psychomotor	**Apply**
CO5	**Explain** Newton- Raphson	Psychomotor	**Apply**

Unit I Introduction	**3 Hours**
Explore MATLAB Arithmetic Operations Arrays	
Unit II	**3 Hours**
Functions Control flow Plotting	
Unit III	**3 Hours**
Programming in MATLAB Loading and saving data Linear equations	
Unit IV	**3 Hours**
Linear regression Linear least squares regression	
Unit V	**3 Hours**
Nonlinear Equations Newton- Raphson in single variable	

HOURS	**Practical**	**TOTAL**
	45	**45**

COURSE CODE			XBC505B	**L**	**T**	**P**	**C**
COURSE NAME			R Programming Lab	**0**	**0**	**2**	**2**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1**	**0**		**0**	**0**	**3**	**3**
PREREQUISITE			Java Programming lab				

Course outcomes:		**Domain**	**Level**
CO1	**Explain** the basic operations	Psychomotor	**Apply**
CO2	**Describe** Looping	Psychomotor	**Apply**
CO3	**Apply strings and arithmetic operations**	Psychomotor	**Apply**
CO4	**Describe** searching	Psychomotor	**Apply**
CO5	**Explain** Data viewer functions.	Psychomotor	**Apply**

Unit I Introduction	**3 Hours**

1.Write a program to check whether a year (integer) entered by the user is a leap year or not? 2. Write a program to create two 3 X 3 matrices A and B and perform the following operations a) Transpose of the matrix b) addition c) subtraction	
Unit II	**3 Hours**
Write an R program to find the sum of natural numbers without formula using the if–else statement and the while loop	
Unit III	**3 Hours**
1.Write an R program to make a simple calculator that can add, subtract, multiply and divide using switch cases and functions. 2.Write an R program to create a list containing strings, numbers, vectors and logical values and do the following manipulations over the list. a. Access the first element in the list b. Give the names to the elements in the list c. Add element at some position in the list d. Remove the element	
Unit IV	**3 Hours**
Write a program to perform searching within a list (1 to 50). If the number is found in the list, print that the search is successful otherwise print that the number is not in the list.	
Unit V	**3 Hours**
1.Create a list and data frame that stores the marks of any three subjects for 10 students. Find out the total marks, average, maximum marks and minimum marks of every subject. 2. Write the steps to import data from Excel to CSV files and apply data viewer functions like rm(),dim(), head(), tail(), sorting, filtering, searching to view few set of rows.	

HOURS	**Practical**	**TOTAL**
	45	**45**

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**	**2**	**1**	**1**	**1**	**1**	**2**
CO2	**3**	**1**	**3**	**2**	**1**	**1**	**1**	**1**	**2**
CO3	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**
CO4	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**2**	**2**
CO5	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**1**
Average	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**2**

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

COURSE CODE			XBC505C	L	T	P	C
COURSE NAME			Python Programming Lab	0	0	2	2
C	P	A		L	T	P	H
0	1	0		0	0	2	3
PREREQUISITE			Java Programming Lab				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Explain** Basic operations in python	Psychomotor	**Apply**
CO2	**Describe** Append, remove create and tuples	Psychomotor	**Apply**
CO3	**Apply** dictionaries and control statements	Psychomotor	**Apply**
CO4	**Describe** Fibonacci and modules in python	Psychomotor	**Apply**
CO5	**Explain** string manipulations.	Psychomotor	**Apply**

Unit I Introduction — **3 Hours**

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 — **3 Hours**

1.Write a python script to print the current date in the following format “Fri Oct 11 02:26:23 IST 2019”
2. Write a program to create, append, and remove lists in python.
3. Write a program to demonstrate working with tuples in python.

Unit III — **3 Hours**

1. Write a program to demonstrate working with dictionaries in python.
2. Write a python program to find largest of three numbers.
3. Write a Python program to construct the following pattern, using a nested for loop

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

Unit IV — **3 Hours**

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

Unit V — **3 Hours**

1.Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order. 2.Write a Python class to convert an integer to a roman numeral. 3.Write a Python class to reverse a string word by word.

HOURS	Practical	TOTAL
	45	45

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

COURSE CODE			XBC506A	L	T	P	C
COURSE NAME			.NET Lab	0	0	2	2
C	P	A		L	T	P	H
0	1	0		0	0	2	3
PREREQUISITE			Web Technology				

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Explain** .NET Environment.	Psychomotor	**Apply**
CO2	**Describe control statements**	Psychomotor	**Apply**
CO3	**Apply** Basic operations	Psychomotor	**Apply**
CO4	**Describe** various controls available in ASP.NET	Psychomotor	**Apply**
CO5	**Illustrate** Real Time projects	Psychomotor	**Apply**

Unit I Introduction	3 Hours
1.Familiarizing with .NET Environment.	

Unit II	3 Hours
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	**3 Hours**
1. Insert, Delete, Update and Modify Operations 2. Store and retrieve data using Data Grids	
Unit IV	**3 Hours**
1. Working with various Controls 2. Using stored Procedures 3. Form Creation with HTML	
Unit V	**3 Hours**
1. Real Time Projects	

HOURS	**Practical**	**TOTAL**
	45	**45**

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

COURSE CODE			XBC506B	**L**	**T**	**P**	**C**
COURSE NAME			GIMP (GNU Image Manipulation Program) Lab	**0**	**0**	**2**	**2**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1**	**0**	Nil	**0**	**0**	**2**	**3**
PREREQUISITE							

Course outcomes:		**Domain**	**Level**
CO1	**Explain Basic operations**	Psychomotor	**Apply**
CO2	**Describe various selection and drawings**	Psychomotor	**Apply**
CO3	**Apply various styles in an images**	Psychomotor	**Apply**
CO4	**Describe text effects with in an image**	Psychomotor	**Apply**

CO5	**Illustrate Logo creation**	Psychomotor	**Apply**
Unit I Introduction			**3 Hours**
Selecting, Stroking and Filling			
Unit II			**3 Hours**
Drawings and multiple selections			
Unit III			**3 Hours**
Image settings			
Unit IV			**3 Hours**
Text effects in Images			
Unit V			**3 Hours**
Logo creation			

HOURS	**Practical**	**TOTAL**
	45	**45**

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	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
Averge	2	3	3	3	3	1	1	3	2

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

COURSE CODE			XBC506C	**L**	**T**	**P**	**C**
COURSE NAME			Theory of Computation Lab	**0**	**0**	**2**	**2**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1**	**0**		**0**	**0**	**2**	**3**
PREREQUISITE			Nil				

Course outcomes:		**Domain**	**Level**
CO1	**Explain** Binary strings	Psychomotor	**Apply**
CO2	**Describe** language of Binary strings	Psychomotor	**Apply**
CO3	**Apply** parenthesized express	Psychomotor	**Apply**
CO4	**Describe** language of Binary strings	Psychomotor	**Apply**
CO5	**Illustrate** Language generated	Psychomotor	**Apply**

Unit I Introduction	**3 Hours**
Language of Binary strings which ends with the pattern 101.	
Unit II	**3 Hours**
Language of Binary strings such that the third symbol from the end is a Zero	
Unit III	**3 Hours**
Language of parenthesized expressions with matching left and right parenthesis.	
Unit IV	**3 Hours**
Language of Binary strings with equal number of Zeros and Ones.	
Unit V	**3 Hours**
Language generated by the grammar {a n bn cn | n³ 1},Language { ap | p is prime}	

HOURS	**Practical**	**TOTAL**
	45	**45**

Table 1: Mapping of COs with Pos

Course Outcomes	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	0	1	1	0	1	0	1	2
CO2	2	2	2	1	1	0	1	2	3
CO3	1	2	2	1	2	1	1	2	3
CO4	0	1	2	2	2	1	0	2	3
CO5	1	2	3	2	3	2	1	3	3
Average	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**3**

1-5 → 1, 6 -10 → 2, 11 -15 → 3

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

XUMA005			**CYBER SECURITY**	**L**	**T**	**P**	**SS**	**C**
				1	0	0	0	**1**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0**	**0**		1	0	0	1	2

PREREQUISITE: Computer Networks

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	Cognitive	Understand

	security.		Apply
CO5	***Identify*** and ***Apply*** the perfect law and Act in real life.	Cognitive	Remember Apply

UNIT I	**INTRODUCTION AND THREATS TO INFORMATION SYSTEMS**	**3**

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**	**3**

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**	**3**

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**	**3**

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**	**3**

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	SELF STUDY	TOTAL
15	**0**	**0**	**15**	**30**

TEXT BOOKS

5. Nina S.Godbole, 2009. "*Information Systems Security*", John wiley & sons India Private Limited,
6. Mark Merkow, Jim Breithaupt, "*Information Security*", Pearson Education.
7. Yadav, D S., 2001. "*Foundations of Information Technology*", New Age International
8. publisher, Delhi.

REFERENCES:

4. Corey Schou, Daniel Shoemaker, 2006. "*Information Assurance for the Enterprise*", Tata

McGraw Hill.
5. Vivek Sood, 2001. "Cyber Laws Simplified", Mc Graw Hill Education private Limited.
6. Steven M. Furnell, 2005 ., "Computer Insecurity", Springer Publisher.

E – REFERENCES:

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/

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

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+3
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.		
UNIT II	**CSS & JAVASCRIPT**	**9+3**
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.		
UNIT III	**PHP BASIC CONCEPTS**	**9+3**

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		
UNIT IV	**PHP ADVANCED CONCEPTS**	**9+3**
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		
UNIT V	**PHP & MySQL**	**9+3**
MySQL Database – Connect – Create DB – Create Table – Insert Data – Get Last ID – Insert Multiple - Select Data – Delete Data – Update Data – Limit Data		

LECTURE	TUTORIAL	PRACTICAL	ELF STUDY	TOTAL
45	15	0	-	60

TEXT BOOKS

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

REFERENCES:

3. N.P. Gopalan, J.Akilandeswari, "Web Technology: A Developer's Perspective", Second Edition, PHI Learning Private Limited, 2014.
4. 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

XBC601B			MOBILE APPLICATION AND DEVELOPMENT	L	T	P	SS	C
				3	1	**0**	**0**	**4**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0**	**0**		3	1	**0**	**0**	**4**

PREREQUISITE: Operating system

Course Outcomes		**Domain**	**Level**
CO1	***Recognize*** the significance of Android platform and its architecture	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+3**

(Introduction) What is Android, Android Versions and its Feature Set, Various Android Devices on the Market, Android Market Application Store, Android Development Environment System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs).

UNIT II	**ANDROID ARCHITECTURE OVERVIEW AND APPLICATION**	**9+3**

Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files.

UNIT III	**ANDROID SOFTWARE DEVELOPMENT PLATFORM AND FRAMEWORK**	**9+3**

Understanding Java SE and the Dalvik Virtual Machine, The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML, Screen Sizes , Launching Mobile Application: The AndroidManifest.xml File, Android Application Components, Android Activities: Defining the UI, Android Service s: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components.

UNIT IV	**UNDERSTANDING ANDROID USER INTERFACES, VIEWS AND LAYOUTS**	**9+3**

Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with Seek Bar, Working

with Menus using views, Gallery, Image Switcher, Grid View, and Image View views to display images, Creating Animation.		
UNIT V	**DATABASES, INTENTS, LOCATION-BASED SERVICES**	**9+3**
Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers Intents and Intent Filters: Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers. Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, sending email, Introduction to location-based service, configuring the Android Emulator for Location -Based Services, Geocoding and Map-Based Activities Multimedia: Audio, Video, Camera: Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	0	-	60

TEXT BOOK

3. Android Programming Unleashed (1st Edition) by Harwani.

4. Beginning Mobile Application Development in the Cloud (2011), Richard Rodger

REFERENCES:

3. Professional Android 4 Application Development, 3rd edition, retomeier, wiley publication 2012.
4. Programming Android, 1st Edition, ZigurdMednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura, Oreilly publications, 2011.

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

XBC601C			CLOUD COMPUTING	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	H
3	0	0		3	1	0	0	4

PREREQUISITE: Computer Networks

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the importance of cloud computing behind all communications and day to day life activities.	Cognitive Psychomotor	Remember Perception

CO2	***Express*** the functionalities of each cloud services and aware of the various cloud service providers	Cognitive	Understand
CO3	***Employ*** the understanding of the various scheduling activities and actively ***participate*** in terms for the creation of various cloud services.	Cognitive	Apply Respond
CO4	***Utilize*** the cloud services tools effectively in the real world applications.	Cognitive	Apply
CO5	***Design*** and ***Establish*** the cloud services and cloud storage	Cognitive Psychomotor	Create Set

UNIT I	**INTRODUCTION TO CLOUD COMPUTING**	**9+3**

Definition, characteristics, components, Cloud service provider, the role of networks in Cloud computing, Cloud deployment models- private, public & hybrid, Cloud service models, multitenancy, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure, SaaS.

UNIT II	**VIRTUALIZATION**	**9+3**

Virtualization concepts , Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, VMware hypervisors and their features.

UNIT III	**DATA IN CLOUD COMPUTING**	**9+3**

Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map-Reduce model, Parallel efficiency of MapReduce, Relational operations using Map-Reduce, Enterprise batch processing using MapReduce.

UNIT IV	**CLOUD SECURITY**	**9+3**

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges : Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.

UNIT V	**ISSUES IN CLOUD COMPUTING**	**9+3**

Implementing real time application over cloud platform, Issues in Inter -cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoringin a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring.

LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**15**	**0**	**-**	**60**

TEXT BOOK

3. System Analysis and Design – Awadh
4. Analysis & Design of Information system – James A. Senn –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	1	1	2	1	1	1	1	2	1
CO2	1	2	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	1	3	2	1	1	2	1	1
Average	1	1	2	1	1	1	1	2	1

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

XBC602A			INTERNET OF THINGS	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	H
3	0	0		3	1	0	0	4

PREREQUISITE: Computer Networks

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	9+3

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	9+3

Basics of Networking, 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, Protocol Classification, MQTT& SMQTT, IEEE 802.15.4, Zigbee)

UNIT III	ARDUINO PROGRAMMING	9+3

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

UNIT IV	PYTHON PROGRAMMING	9+3
Introduction to Python Programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Implementation of IoT with Raspberry Pi		
UNIT V	**DATA ANALYTICS**	**9+3**
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
45	15	0	0	60

TEXT BOOK

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

REFERENCES:

7. CharalamposDoukas , Building Internet of Things with the Arduino, Create space, April 2002.
8. 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
9. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011
10. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010
11. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
12. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

E-REFERENCES

3. http://postscapes.com
4. 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

XBC602B			DATA MINING	L	T	P	SS	C
				3	1	**0**	**0**	**4**
C	P	A		L	T	P	SS	H
3	0	0		3	1	**0**	**0**	**4**

PREREQUISITE: DBMS

Course Outcomes		**Domain**	**Level**
CO1	***Analyze*** and Demonstrate advanced knowledge of data mining concepts and techniques	Cognitive	Analyze
CO2	***Evaluate*** and Apply the techniques of clustering, classification, association finding, feature selection and visualization on real world data various mining techniques on complex data objects	Cognitive	Evaluate
CO3	***Understand and*** Determine whether a real-world problem has a data mining solution	Cognitive	Understand
CO4	***Choose and*** Apply data mining software and toolkits in a range of applications	Cognitive Affective	Apply Respond
CO5	***Recognize*** and Set up a data mining process for an application, including data preparation, modelling and evaluation	Cognitive Psychomotor	Analyze Perception

UNIT I	**INTRODUCTION TO DATA MINING**	**12**
Introduction to Data Mining, Understanding Data, Relations to Database, Statistics, Machine Learning.		
UNIT II	**ASSOCIATION RULE MINING**	**12**
Association Rule Mining, Level-wise Method, FP-Tree Method, Other Variants		
UNIT III	**CLASSIFICATION**	**12**
Classification, Decision Tree Algorithm, CART, PUBLIC, Pruning Classification Tree.		
UNIT IV	**CLUSTERING**	**12**
Clustering Techniques, Clustering of Numeric Data, of Ordinal Data, Efficiency of Clustering, Consensus Clustering, Spectral Clustering.		
UNIT V	**ROC ANALYSIS**	**12**
Rough Set Theory and its Application to Data Mining, ROC Analysis,Data Mining Trends, Big Data, Data Analytics.		

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

TEXT BOOK

2. Data Mining Techniques (4th Edition) Universities Press Arun K Pujari

REFERENCES:

2. Data Mining Introductory And Advanced Topics –Margaret H Dunham, Pearson Education

E-REFERENCES:

3. http://www.tutorialspoint.com/data_mining
4. http://www.dataminingconsultant.com/resources.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	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

XBC602C			ARTIFICIAL INTELLIGENCE	L	T	P	SS	C
				3	1	**0**	**0**	**4**
C	P	A		L	T	P	SS	H
3	0	0		3	1	**0**	**0**	**4**

PREREQUISITE: Data Structure

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Analyze*** what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence	Cognitive	Analyze
CO2	***Evaluate***AI methods, and which AI methods may be suited to solving a given problem.	Cognitive	Evaluate
CO3	***Understand*** a given problem in the language/framework of different AI methods.	Cognitive	Understand
CO4	***Choose an*** algorithm on a problem formalization, and state the conclusions that the evaluation supports.	Cognitive	Apply
CO5	***Recognize*** the limitations of current Artificial Intelligence techniques	Cognitive	Analyze

UNIT I	**INTRODUCTION TO ARTIFICAL INTELLIGENCE**	**12**

Introduction to Artificial Intelligence: Definition of AI; Turing Test; Brief History of AI. Problem Solving and Search: Problem Formulation; Search Space; States vs. Nodes; Tree Search: Breadth-First, Uniform Cost, Depth-First, Depth-Limited, Iterative Deepening; Graph Search.

UNIT II	**INFORMED SEARCH**	**12**

Informed Search: Greedy Search; A* Search; Heuristic Function; Admissibility and Consistency; Deriving Heuristics via Problem Relaxation. Local Search: Hill -Climbing; Simulated Annealing; Genetic Algorithms; Local Search in Continuous Spaces. Playing Games: Game Tree; Utility Function; Optimal Strategies; Minimax Algorithm; Alpha-Beta Pruning; Games with an Element of Chance. Beyond Classical Search: Searching with Nondeterministic Actions; Searching withPartial Observations; Online Search Agents; Dealing with Unknown Environments

UNIT III	**PLAYING GAMES**	**12**

Knowledge Representation and Reasoning: Ontologies, Foundations of Knowledge

Representation and Reasoning, Representing andReasoning about Objects, Relations, Events, Actions, Time, and Space; Predicate Logic, Situation Calculus, Description Logics, Reasoning with Defaults, Reasoning about Knowledge, Sample Applications. Representing and Reasoning with Uncertain Knowledge: Probability, Connection to Logic, Independence, Bayes Rule, Bayesian Networks, Probabilistic Inference, and Sample Applications.		
UNIT IV	**KNOWLEDGE REPRESENTATION AND REASONING**	**12**
Representing and Reasoning with Uncertain Knowledge: Probability, Connection to Logic, Independence, Bayes Rule, Bayesian Networks, Probabilistic Inference, and Sample Applications. Planning: The STRIPS Language; Forward Planning; Backward Planning; Planning Heuristics; Partial-Order Planning; Planning using Propositional Logic; Planning vs. Scheduling		
UNIT V	**CONSTRAINT SATISFACTION PROBLEMS**	**12**
Constraint Satisfaction Problems (CSPs): Basic Definitions; Finite vs. Infinite vs. Continuous Domains; Constraint Graphs; Relationship with Propositional Satisfiability, Conjunctive Queries, Linear Integer Programming, and Diophantine Equations; NP - Completeness of CSP; Extension to Quantified Constraint Satisfaction (QCSP). Constraint Satisfaction as a Search Problem; Backtracking Search; Variable and Value Ordering Heuristic; Degree Heuristic; Least-Constraining Value Heuristic; Forward Checking; Constraint Propagation; Dependency-Directed Backtracking;		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	0	0	60

TEXT BOOK

Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Third Edition, McGraw Hill Edition

REFERENCES:

Russell Stuart Jonathan and Norvig Peter, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, 2010

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

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

XBC602D			COMPUTER GRAPHICS	L	T	P	SS	C
				3	1	**0**	**0**	**4**
C	P	A		L	T	P	SS	H
3	0	0		3	1	**0**	**0**	**4**

PREREQUISITE: Algorithms

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Analyze*** the concepts and relevant mathematics of computer graphics.	Cognitive	Analyze
CO2	***Evaluate***various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.	Cognitive	Evaluate
CO3	***Understand*** the importance of viewing and projections.	Cognitive	Understand
CO4	***Choose a*** design application that display graphic images to given specifications.	Cognitive	Apply
CO5	***Recognize*** the fundamentals of animation and Virtual reality technologies	Cognitive	Analyze

UNIT I	**APPLICATION AREAS OF COMPUTER GRAPHICS**	**12**

Application Areas of Computer Graphics, Overview of Graphics Systems and Devices. Points and Lines, Line Drawing Algorithms, Mid -Point Circle and Ellipse Algorithms. Filled Area Primitives, Polygon Filling Algorithms. Curve Generation: Bezier and B-Spline Curves.

UNIT II	**2-D GEOMETRICAL TRANSFORMS**	**12**

2-D Geometrical Transforms: Translation, Scaling, Rotation, Reflection and Shear Transformations Composite Transforms, Transformations between Coordinate Systems. 2-D Viewing: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window to Viewport Coordinate Transformation, Viewing Functions. Line Clipping Algorithms-Cohen-Sutherland and Cyrus Beck Line Clipping Algorithms, Sutherland–Hodgeman Polygon Clipping Algorithm.

UNIT III	**3-D OBJECT REPRESENTATION**	**12**

3-D Object Representation: Polygon Surfaces, Quadric Surfaces, Spline Representation. 3-D Geometric Transformations: Translation, Rotation, Scaling, Reflection and Shear Transformations, Composite Transformations, 3-D Viewing: Viewing Pipeline, Viewing Coordinates, View Volume, General Projection Transforms and Clipping.

UNIT IV	**VISIBLE SURFACE DETECTION METHODS**	**12**

Visible Surface Detection Methods: Classification, Back -Face Detection, Depth- Buffer, Scanline, Depth Sorting, BSP-Tree Methods, Area Sub-Division and Octree Methods Illumination Models and Surface Rendering Methods: Basic Illumination Models, Polygon Rendering Methods Computer Animation: Design of Animation Sequence, General Computer Animation Functions Key Frame Animation, Animation Sequence, Motion Control Methods, Morphing, Warping (Only Mesh Warping)

UNIT V	**VIRTUAL REALITY**	**12**

Virtual Reality: Basic Concepts, Classical Components of VR System, Types of VR Systems, Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces,

Gesture Interfaces. Input Devices, Graphical Rendering Pipeline, Haptic Rendering Pipeline, Open GL Rendering Pipeline. Applications of Virtual Reality.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**15**	**0**	**0**	**60**
TEXT BOOK				
3. Donald Hearn and M. Pauline Baker, "Computer Graphics with Open GL", Prentice Hall. 4. R. K Maurya, "Computer Graphics with Virtual Reality", Wiley				
REFERENCES:				
1. "Computer Graphics Principles & practice", Foley, Van Dam, Feiner and Hughes, Pearson Education.				

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	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

XBC603A			**INTRODUCTION TO MACHINE LEARNING**	L	T	P	SS	C
				3	1	**0**	**0**	**4**
C	P	A		L	T	P	SS	H
3	0	0		3	1	**0**	**0**	**4**

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*** supervised algorithm for solving a problem.	Cognitive	Understand
CO3	***Understand*** un supervised algorithm for solving a problem.	Cognitive	Understand
CO4	***Understand Reinforcement Techniques*** *and solve the problem.*	Cognitive	Understand Apply
CO5	***Recognize*** the neural network model	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**12**
Introduction Artificial Intelligence - Characteristics of AI – AI problems and Problem solving methods- Components of learning – learning - types of learning – supervised – unsupervised – reinforcement		
UNIT II	**SUPERVISED ALGORITHMS**	**12**
Introduction to Supervised Learning Algorithm – Categories of Supervised Learning Algorithms – Regression – Logistic Regression - Classification – Naïve Bayes Classifiers.		
UNIT III	**UN SUPERVISED ALGORITHMS**	**12**
Introduction to Unsupervised Learning Algorithms – Categories of Unsupervised Learning Algorithms – Clustering – K-Means Clustering - Association – Aprori Algorithms.		
UNIT IV	**REINFORCEMENT**	**12**
Introduction to Reinforcement Learning – Types of Reinforcement – Q-Learning Techniques – Implementation of Q-Learning Techniques.		
UNIT V	**NEURAL NETWORKS**	**12**
Introduction to Neural Networks – Evolution – CNN – RNN – LSTM - Implementation		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	0	0	60

TEXT BOOK

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

REFERENCES:

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

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

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

		L	T	P	SS	C

XBC603B			HUMAN COMPUTER INTERFACE	3	1	**0**	**0**	**4**
C	P	A		L	T	P	SS	H
3	0	0		3	1	**0**	**0**	**4**

PREREQUISITE: Fundamentals of Computer

Course Outcomes		**Domain**	**Level**
CO1	***Analyze*** the concepts relating to the design of human - computer interfaces in ways making computer-based systems comprehensive, friendly and usable	Cognitive	Analyze
CO2	Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces	Cognitive	Evaluate
CO3	Choose the important aspects of implementation of human-computer interfaces	Cognitive	Apply
CO4	Identify the various tools and techniques for interface analysis, design, and evaluation.	Cognitive	Apply
CO5	Identify the impact of usable interfaces in the acceptance and performance utilization of information systems.	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**12**

Introduction: Historical Evolution of HCI, Interactive System Design: Concept of Usability- Definition and Elaboration, HCI and Software Engineering, GUI Design and Aesthetics, Prototyping Techniques.

UNIT II	**MODEL-BASED DESIGN**	**12**

Model-Based Design and Evaluation: Basic Idea, Introduction to Different Types of Models, GOMS Family of Models (KLM And CMN -GOMS), Fitts' Law and Hickhyman's Law.

UNIT III	**GENERAL DEVELOPMENT**	**12**

General Development Guidelines and Principles: Shneiderman's Eight Golden Rules, Norman's Seven Principles, Norman's Model of Interaction, Nielsen's Ten Heuristics with Example of its use, Contextual Inquiry.

UNIT IV	**DIALOG DESIGN**	**12**

Dialog Design: Introduction to Formalism in Dialog Design, Design using FSM (Finite State Machines), State Charts and (Classical) Petri Nets in Dialog Design. Task Modeling and Analysis: Hierarchical Task Analysis (HTA), Engineering Task
Models and Concur Task Tree (CTT).

UNIT V	**OBJECT ORIENTED MODELLING**	**12**

Object Oriented Modelling: Object Oriented Principles, Definition of Class and Object and their Interactions, Object Oriented Modelling for User Interface Design, Case Study Related to Mobile Application Development.

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

TEXT BOOK

5. Dix A., Finlay J.,Abowd G. D. and Beale R. Human Computer Interaction, 3 rd

edition, Pearson Education, 2005.
6. Preece J., Rogers Y.,Sharp H.,Baniyon D., Holland S. and Carey T. Human Computer
7. Interaction,Addison-Wesley, 1994.
8. B.Shneiderman; Designing the User Interface,Addison Wesley 2000 (Indian Reprint).

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

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

XBC603C			DATA ANALYTICS	L	T	P	SS	C
				3	1	**0**	**0**	**4**
C	P	A		L	T	P	SS	H
3	0	0		3	1	**0**	**0**	**4**

PREREQUISITE: Data Mining

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Analyze*** what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence	Cognitive	Analyze
CO2	***Evaluate***AI methods, and which AI methods may be suited to solving a given problem.	Cognitive	Evaluate
CO3	***Understand*** a given problem in the language/framework of different AI methods.	Cognitive	Understand
CO4	***Choose an*** algorithm on a problem formalization, and state the conclusions that the evaluation supports.	Cognitive	Apply
CO5	***Recognize*** the limitations of current Artificial Intelligence techniques	Cognitive	Analyze

UNIT I	INTRODUCTION	12
Data Definitions and Analysis Techniques: Elements, Variables, and Data Categorization, Levels of Measurement, Data Management and Indexing.		
UNIT II	**DESCRIPTIVE STATISTICS**	**12**
Descriptive Statistics: Measures of Central Tendency, Measures of Location of Dispersions, Error Estimation and Presentation (Standard Deviation, Variance), Introduction to Probability		
UNIT III	**BASIC ANALYSIS TECHNIQUES**	**12**

Basic Analysis Techniques: Statistical Hypothesis Generation and Testing, Chi-Square Test, T -Test, Analysis of Variance, Correlation Analysis, Maximum Likelihood Test.		
UNIT IV	**DATA ANALYSIS TECHNIQUES-I**	**12**
Data Analysis Techniques - I: Regression Analysis, Classification Techniques, Clustering Techniques (K-Means, K-Nearest Neighborhood). Data Analysis Techniques-II: Association Rules Analysis, Decision Tree.		
UNIT V	**INTRODUCTION TO R PROGRAMMING**	**12**
Introduction to R Programming: Introduction to R Software Tool, Statistical Computations using R (Mean, Standard Deviation, Variance, Regression, Correlation etc.). Practice and Analysis with R and Python Programming, Sensitivity Analysis.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	0	0	60

TEXT BOOK

3. Probability and statistics for Engineers and Scientists (9 Edn.), Ronald E Walppole, Raymond H Myres, Sharon L. Myres and Leying Ye, Prentice Hall Inc
4. The Elements of Statistical Learning, Data Mining, Inference, and Prediction (2nd Edn.) Travor Hastie Robert Tibshirani Jerome Friedman, Springer, 2014

REFERENCES:

2. Software for Data Analysis: Programming with R (Statistics and Computing), John M. Chambers, Springer

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

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

COURSE CODE			XBC604A	**L**	**T**	**P**	**C**
COURSE NAME			Web Technologies Lab	**0**	**0**	**1**	**1**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1**	**0**		**0**	**0**	**1**	**2**
PREREQUISITE			.Net				
COURSE OUTCOMES:							
Course outcomes:			**Domain**	**Level**			

CO1	**Create basic website with images and hyperlink.**	Psychomotor	**Apply**
CO2	**Design Website with links and validations**	Psychomotor	**Apply**
CO3	**Apply** Basic operations	Psychomotor	**Apply**
CO4	**Describe** various functions	Psychomotor	**Apply**
CO5	**Illustrate** Real Time projects with front end and back end	Psychomotor	**Apply**

Unit I Introduction	**3 Hours**
1. Formatting tags, ordered list and unordered list. 2.Tables, frame, image map and hyperlink.	
Unit II	**3 Hours**
1.Font, color and style 2. Background and Links 3.Form Validation 4.Looping and Conditional Statements	
Unit III	**3 Hours**
1. Strings and Operators 2.Flow of controls and Arrays 3.PHP Forms 4.PHP Functions	
Unit IV	**3 Hours**
1.File Handling 2.Exception Handling 3. PHP Sessions and Cookies	
Unit V	**3 Hours**
PHP with MySQL	

HOURS	**Practical**	**TOTAL**
	45	**45**

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

COURSE CODE			XBC604B	**L**	**T**	**P**	**C**
COURSE NAME			Mobile application development lab	**0**	**0**	**1**	**1**
C	**P**	**A**		**L**	**T**	**P**	**H**
0	**1**	**0**		**0**	**0**	**1**	**2**
PREREQUISITE			Nil				

Course outcomes:		**Domain**	**Level**
CO1	**Design basic Applications**	Psychomotor	**Apply**
CO2	**Design with fragments and Intents**	Psychomotor	**Apply**
CO3	**Apply** views and create dialogs	Psychomotor	**Apply**
CO4	**Apply implementation**	Psychomotor	**Apply**
CO5	**Communication generating and finding locations.**	Psychomotor	**Apply**

Unit I Introduction	**3 Hours**
1. Installing Android 2. Create a simple application	

Unit II	**3 Hours**
1. Working with fragments 2. Working with Intents and intent filters. 3. Creating contact based application.	

Unit III	**3 Hours**
1.Working with views 2.Creating Dialogs and toasts 3.Working with Pop-up Menu	

Unit IV	**3 Hours**
1.Quotes provider app 2. SQLite database app 3. Implement notification	

Unit V	**3 Hours**
1. Working with exception handling 2. Finding your location using GPS. 3. Bluetooth communication / SMS communication	

HOURS	**Practical**	**TOTAL**
	45	**45**

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

COURSE CODE			XBC604C		L	T	P	C
COURSE NAME			Cloud Computing lab		0	0	1	1
C	P	A			L	T	P	H
0	1	0			0	0	2	2
PREREQUISITE			Mobile application development					

Course outcomes:		Domain	Level
CO1	Install Virtual box /VMware/ C compiler to execute programs	Psychomotor	Apply
CO2	**To use cloud sim**	Psychomotor	Apply
CO3	**Apply** views and create dialogs	Psychomotor	Apply
CO4	**File transfer from one virtual machine to another virtual machine**	Psychomotor	Apply
CO5	**Hadoop Installation**	Psychomotor	Apply

Unit I Introduction	3 Hours
1.Install Virtual box /VMware Workstation with different flavours of linux or windows OS with virtualization support 2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs	
Unit II	**3 Hours**
1.Install Google App Engine. Create hello world app and other simple web applications using python/java.	
Unit III	**3 Hours**
1.Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm that is not present in Cloud Sim.	
Unit IV	**3 Hours**
1. Experiment a procedure to transfer the files from one virtual machine to another virtual machine. 2. Experiment a procedure to launch virtual machine using try stack (Online Open stack Demo Version)	

Unit V	3 Hours
1.Install Hadoop single node cluster and run simple applications like word count	

HOURS	Practical	TOTAL
	45	45

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	1	2	1	1	1	1	2	1
CO2	1	2	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	1	3	2	1	1	2	1	1
Average	1	1	2	1	1	1	1	2	1

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