MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC, NBA & Affiliated to Anna University)

Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Estd. 2000

Curriculum/Syllabus

Programme Code : CY

Programme Name : B.E.-Cyber Security

Regulation : R-2019

MUTHAYAMMAL ENGINEERING COLLEGE

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(Approved by AICTE, Accredited by NAAC & NBA, Affiliated to Anna University)

Rasipuram - 637 408, Namakkal Dt, Tamil Nadu.

Ph. No.: 04287-220837

Email: principal@mec.edu.in.

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Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

INSTUTION VISION &MISSION

INSTUTION VISION

To be a Centre of Excellence in Engineering, Technology and Management on par with International Standards.

INSTUTION MISSION

- To prepare the students with high professional skills and ethical values
- To impart knowledge through best practices
- To instill a spirit of innovation through Training, Research and Development
- To undertake continuous assessment and remedial measures
- To achieve academic excellence through intellectual, emotional and social stimulation

INSTUTIONMOTTO

Rural upliftment through Technical Education.

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DEPARTMENT VISION & MISSION

DEPARTMENT VISION

To educate and prepare technocrats in Cyber Security with global standard

DEPARTMENT MISSION

M1: To prepare the students with excellence and ethics in Cyber Security

M2: To inculcate of life learning through best practice

M3: To excel in academic and research through innovation

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DEPARTMENT PROGRAM EDUCATIONAL OBJECTIVES, PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES

PROGRAM EDUCATIONAL OBJECTIVES

The Information Technology Graduates should be able to

PEO1: Graduates will be able to exhibit as Cyber Security Professional in global standard

PEO2: Graduates will be able to successfully adapt to new technologies, tools and methodologies for career development

PEO3: Graduates will be able to provide technical leadership and service to their business, profession and society

PROGRAM OUTCOMES

PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 - Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 - The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 - Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 - Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 - Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 - Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO1: Graduates should be able to analyze and resolve security issues in networks and computer systems to secure an IT infrastructure

PSO2: Graduates should be able to recognize professional responsibilities and computing practice based on legal and ethical principles

PSO3: Graduates should be able to develop policies and procedures to manage enterprise security risk.

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637408, NamakkalDist.,TamilNadu

B.E.-CYBER SECURITY

GROUPINGOFCOURSES

1. HumanitiesandSocialSciences(HS)

S. No.	Course Code	CourseTitle	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	19HSS01	Business English	HS	2	2	0	0	2
2.	19HSS02	English Communicative Skills Laboratory	HS	2	0	0	2	1
3.	19HSS03	Life Skill and Work Place Psychology	HS	2	2	0	0	2
4.	19HSS04	Technical English For Engineers	HS	2	2	0	0	2
5.	19HSS05	Communicative English for Engineers	HS	2	2	0	0	2
6.	19HSS06	Basics of Japanese Language	HS	2	2	0	0	2
7.	19HSS07	Basics of French Language	HS	2	2	0	0	2
8.	19HSS08	Professional Ethics and Human Values	HS	3	3	0	0	3

2. BasicSciences(BS)

S. No.	Course Code	CourseTitle	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	19BSS01	Engineering Physics	BS	3	3	0	0	3
2.	19BSS02	Physics and Chemistry Laboratory	BS	2	0	0	2	1
3.	19BSS03	Bio and Nanomaterials Sciences	BS	3	3	0	0	3
4.	19BSS04	Material Sciences	BS	3	3	0	0	3
5.	19BSS05	Physics for Mechanical Engineers	BS	3	3	0	0	3
6.	19BSS11	Engineering Chemistry	BS	3	3	0	0	3
7.	19BSS12	Environmental Science and Engineering	BS	3	3	0	0	3
8.	19BSS13	Organic Chemistry	BS	3	3	0	0	3
9.	19BSS14	Physical Chemistry	BS	3	3	0	0	3

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10.	19BSS15	Applied Chemistry	BS	3	3	0	0	3
11.	19BSS16	Organic Chemistry Laboratory	BS	2	0	0	2	1
12.	19BSS17	Physical Chemistry Laboratory	BS	2	0	0	2	1
13.	19BSS21	Algebra and Calculus	BS	4	3	1	0	4
14.	19BSS22	Differential Equations and Vector Analysis	BS	4	3	1	0	4
15.	19BSS23	Transform and Partial Differential Equations	BS	4	3	1	0	4
16.	19BSS24	Discrete Mathematics	BS	4	3	1	0	4
17.	19BSS25	Statistical and Queuing Model	BS	4	3	1	0	4
18.	19BSS26	Numerical Methods	BS	4	3	1	0	4
19.	19BSS27	Probability and Random Processes	BS	4	3	1	0	4
20.	19BSS28	Statistic and Numerical Methods	BS	4	3	1	0	4

3. General EngineeringScience(GES)

Sl. No.	Course Code	CourseTitle	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	19GES01	Programming for Problem Solving Using C	GES	3	3	0	0	3
2.	19GES02	Programming for Problem Solving Technique	GES	3	3	0	0	3
3.	19GES03	Programming in C Laboratory	GES	2	0	0	2	1
4.	19GES04	Programming in C and Python Laboratory	GES	2	0	0	2	1
5.	19GES05	Electrical and Electronic Sciences	GES	3	3	0	0	3
6.	19GES06	Mechanical and Building Sciences	GES	3	3	0	0	3
7.	19GES07	Computer Aided Drafting Laboratory	GES	2	0	0	2	1
8.	19GES08	Python Programming	GES	3	3	0	0	3
9.	19GES09	Programming in Python Laboratory	GES	2	0	0	2	1
10.	19GES10	Soft Skills Laboratory	GES	2	0	0	2	1
11.	19GES11	Electronic Devices	GES	3	3	0	0	3
12.	19GES12	Electronic Simulation Laboratory	GES	2	0	0	2	1
13.	19GES13	Electric Circuits	GES	3	2	1	0	3
14.	19GES14	Electric Circuits Laboratory	GES	2	0	0	2	1
15.	19GES15	Manufacturing Process	GES	3	3	0	0	3
16.	19GES16	Manufacturing Process Laboratory	GES	2	0	0	2	1
17.	19GES17	Mechanical and Building Sciences Laboratory	GES	2	0	0	2	1

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18.	19GES18	Construction Materials	GES	3	3	0	0	3
19.	19GES19	Concepts in Product Design	GES	3	3	0	0	3
20.	19GES20	Renewable Energy Sources	GES	3	3	0	0	3
21.	19GES21	Electrical Drives and Control	GES	3	3	0	0	3
22.	19GES22	Electrical Drives and Control Laboratory	GES	2	0	0	2	1
23.	19GES23	Analog and Digital communication	GES	3	3	0	0	3
24.	19GES24	Digital Principles and System Design	GES	3	3	0	0	3
25.	19GES25	Digital Principles and System Design Laboratory	GES	2	0	0	2	1
26.	19GES26	Engineering Drawing	GES	5	1	0	4	3
27.	19GES27	Engineering Geology	GES	3	3	0	0	3
28.	19GES28	Engineering Mechanics	GES	4	3	1	0	4
29.	19GES29	Wireless Communication	GES	4	3	1	0	4
30.	19GES30	Electronics and Microprocessor	GES	3	3	0	0	3
31.	19GES31	Electronics and Microprocessor Laboratory	GES	2	0	0	2	1
32.	19GES32	Data Structures using Python	GES	3	3	0	0	3

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4. ProfessionalCore(PC)

Sl. No.	Course Code	CourseTitle	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	19CYC01	Data Structures	PCC	3	3	0	0	3
2.	19CYC02	Data Structures Laboratory	PCC	2	0	0	2	1
3.	19CYC03	Java Programming	PCC	3	3	0	0	3
4.	19CYC04	Java Programming Laboratory	PCC	2	0	0	2	1
5.	19CYC05	Computer Networks	PCC	3	3	0	0	3
6.	19CYC06	Computer Organization and Architecture	PCC	3	3	0	0	3
7.	19CYC07	Database Management Systems	PCC	3	3	0	0	3
8.	19CYC08	Database Management Systems Laboratory	PCC	2	0	0	2	1
9.	19CYC09	Cryptography and Network security	PCC	3	3	0	0	3
10.	19CYC10	Cryptography and Network security Laboratory	PCC	2	0	0	2	1
11.	19CYC11	Operating Systems	PCC	3	3	0	0	3
12.	19CYC12	Operating Systems Laboratory	PCC	2	0	0	2	1
13.	19CYC13	Information security	PCC	3	3	0	0	3
14.	19CYC14	Digital Forensics	PCC	3	3	0	0	3
15.	19CYC15	Introduction to Cyber Laws	PCC	3	3	0	0	3
16.	19CYC16	Cyber Crime Investigations and Digital Forensics	PCC	3	3	0	0	3
17.	19CYC17	Cloud Computing	PCC	3	3	0	0	3
18.	19CYC18	Cloud Computing Laboratory	PCC	2	0	0	2	1
19.	19CYC19	Web and mobile application security	PCC	3	3	0	0	3
20.	19CYC20	Web and mobile application Laboratory	PCC	2	0	0	2	1
21.	19CYC21	Wireless sensor network security	PCC	3	3	0	0	3
22.	19CYC22	Wireless sensor network Laboratory	PCC	2	0	0	2	1
23.	19CYC23	Forensic Analysis Tools	PCC	3	3	0	0	3
24.	19CYC24	Forensic Analysis Tools Laboratory	PCC	2	0	0	2	1
25.	19CYC25	Data Base Security	PCC	3	3	0	0	3
26.	19CYC26	Data Base Security Laboratory	PCC	2	0	0	2	1
27.	19CYC27	Cyber Defense	PCC	3	3	0	0	3
28.	19CYC28	Risk Management	PCC	3	3	0	0	3
29.	19CYC29	Intrusion Detection and Prevention System	PCC	3	3	0	0	3
30.	19CYC30	Cyber Laws and Ethics	PCC	3	3	0	0	3
31.	19CYC31	Software Engineering	PCC	3	3	0	0	3

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32.	19CYC32	Object Oriented Programming	PCC	3	3	0	0	3
33.	19CYC33	Object Oriented Programming Laboratory	PCC	2	0	0	2	1
34.	19CYC34	Design and Analysis of Algorithms	PCC	3	3	0	0	3
35.	19CYC35	Design and Analysis of Algorithms Laboratory	PCC	2	0	0	2	1
36.	19CYC36	Blockchain Technology	PCC	3	3	0	0	3
37.	19CYC37	Mobile Communication	PCC	3	3	0	0	3
38.	19CYC38	Internet of Things	PCC	3	3	0	0	3
39.	19CYC39	Internet of Things Laboratory	PCC	2	0	0	2	1
40.	19CYC40	Artificial Intelligence	PCC	3	3	0	0	3
41.	19CYC41	Principles of Compiler Design	PCC	3	3	0	0	3
42.	19CYC42	Compiler Design Laboratory	PCC	2	0	0	2	1
43.	19CYC43	Data warehousing and Data Mining	PCC	3	3	0	0	3

5. ProfessionalElective(PE)

Sl. No.	Course Code	CourseTitle	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	19CYE01	C# and .Net Framework	PEC	3	3	0	0	3
2.	19CYE02	Software Project Management	PEC	3	3	0	0	3
3.	19CYE03	Salesforce CRM and Platform	PEC	3	3	0	0	3
4.	19CYE04	Salesforce CRM and Platform Laboratory	PEC	2	0	0	2	1
5.	19CYE05	Biometric Systems & Biometric Image Process	PEC	3	3	0	0	3
6.	19CYE06	AWS Academy Cloud Developing	PEC	3	3	0	0	3
7.	19CYE07	AWS Academy Cloud Developing Laboratory	PEC	2	0	0	2	1
8.	19CYE08	AWS Academy Cloud Architecting	PEC	3	3	0	0	3
9.	19CYE09	AWS Academy Cloud Architecting Laboratory	PEC	2	0	0	2	1
10.	19CYE10	AWS Academy Cloud Foundation	PEC	3	3	0	0	3
11.	19CYE11	AWS Academy Cloud Foundation Laboratory	PEC	2	0	0	2	1
12.	19CYE12	Ethical Hacking And Cyber Forensics	PEC	3	3	0	0	3
13.	19CYE13	Ethical hacking Laboratory	PEC	2	0	0	2	1
14.	19CYE14	Computer Forensics Analysis& Investigation	PEC	3	3	0	0	3

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15.	19CYE15	Computer Forensics Laboratory	PEC	2	0	0	2	1
16.	19CYE16	Semantic Web	PEC	3	3	0	0	3
17.	19CYE17	Network Programming and Management	PEC	3	3	0	0	3
18.	19CYE18	Business Intelligence	PEC	3	3	0	0	3
19.	19CYE19	Wireless Sensor Networks	PEC	3	3	0	0	3
20.	19CYE20	Information Retrieval Techniques	PEC	3	3	0	0	3
21.	19CYE21	Service Oriented Architecture	PEC	3	3	0	0	3
22.	19CYE22	Agile Technology	PEC	3	3	0	0	3
23.	19CYE23	Social Network Analysis	PEC	3	3	0	0	3
24.	19CYE24	Game Programming	PEC	3	3	0	0	3
25.	19CYE25	Natural Language Processing	PEC	3	3	0	0	3
26.	19CYE26	Big data Analytics	PEC	3	3	0	0	3
27.	19CYE27	Ad hoc and Sensor Networks	PEC	3	3	0	0	3
28.	19CYE28	Management Information System	PEC	3	3	0	0	3
29.	19CYE29	Software Quality Assurance	PEC	3	3	0	0	3
30.	19CYE30	Bioinformatics	PEC	3	3	0	0	3
31.	19CYE31	Docker and Kubernetes	PEC	3	3	0	0	3
32.	19CYE32	Open Stack Essentials	PEC	3	3	0	0	3
33.	19CYE33	User Centric Design	PEC	3	3	0	0	3
34.	19CYE34	Software Testing	PEC	3	3	0	0	3
35.	19CYE35	Soft computing	PEC	3	3	0	0	3
36.	19CYE36	Real Time Systems	PEC	3	3	0	0	3
37.	19CYE37	Machine Learning	PEC	3	3	0	0	3
38.	19CYE38	High Speed Networks	PEC	3	3	0	0	3

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6. EmployabilityEnhancementCourses(EEC)

Sl. No.	Course Code	CourseTitle	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	19CYP01	Project Work Phase I	EEC	6	0	0	6	5
2.	19CYP02	Project Work Phase II	EEC	18	0	0	12	10
3.	19CYP03	Comprehension	EEC	2	0	0	2	1
4.	19CYP04	Technical Seminar	EEC	4	0	4	0	2
5.	19CYP05	Entrepreneurship Development	EEC	3	3	0	0	3
6.	19CYP06	Professional Practices	EEC	6	0	0	6	3
7.	19CYM01	NPTEL- Internetwork Security	Mandatory Course	-	-	-	-	-
8.	19CYM02	NPTEL- Systems and Usable Security	Mandatory Course	-	-	-	-	-
9.	19CYM03	NPTEL- Ethical Hacking	Mandatory Course	-	-	-	-	-
10.	19CYM04	NPTEL-Computer Networks and Internet Protocol	Mandatory Course	-	-	-	-	-
11.	19CYA01	Indian Constitution	Audit Course	-	-	-	-	-
12.	19CYA02	Value Education	Audit Course	-	-	-	-	-
13.	19CYA03	Disaster Management	Audit Course	-	-	-	-	-
14.	19CYA04	Pedagogy Studies	Audit Course	-	-	-	-	-
15.	19CYA05	Stress Management by Yoga	Audit Course	-	-	-	-	-

7. Open Electives (OE)

Sl. No.	CourseCode	CourseTitle	Category	Contact Hours	Instruction Hours/Week			C
					L	T	P	
1.	19MEE07	Industrial Automation Robotics	OEC	3	3	0	0	3
2.	19MEE18	Power Plant Engineering	OEC	3	3	0	0	3
3.	19MEC26	Total Quality Management	OEC	3	3	0	0	3
4.	19ECE06	Telecommunication Switching Networks	OEC	3	3	0	0	3
5.	19ECE08	Mobile Ad-Hoc Networks	OEC	3	3	0	0	3
6.	19PC-CED11	Water Supply Engineering	OEC	3	3	0	0	3
7.	19PE-CEE05	Health Monitoring of Structures	OEC	3	3	0	0	3

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SEMESTER–I

Sl. No.	Course Code	CourseName	Category	Hours/Week			Credit	ContactHrs
				L	T	P	C	
1.	19HSS01	BusinessEnglish	HS	2	0	0	2	2
2.	19BSS01	EngineeringPhysics	BS	3	0	0	3	3
3.	19BSS11	EngineeringChemistry	BS	3	0	0	3	3
4.	19BSS21	AlgebraandCalculus	BS	3	1	0	4	4
5.	19GES01	ProgrammingforProblemSolving UsingC	GES	3	0	0	3	3
6.	19GES06	MechanicalandBuildingSciences	GES	3	0	0	3	3
PRACTICAL								
7.	19HSS02	EnglishCommunicativeSkills Laboratory	HS	0	0	2	2	1
8.	19BSS02	PhysicsandChemistryLaboratory	BS	0	0	2	2	1
9.	19GES03	ProgramminginCLaboratory	GES	0	0	2	2	1
TotalCredits							**21**	

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SEMESTER–II

Sl. No.	Course Code	CourseName	Category	Hours/Week			Credit	ContactHrs
				L	T	P	C	
1.	19HSS03	Life Skill and Work Place Psychology	HS	2	0	0	2	2
2.	19BSS12	Environmental Science and Engineering	BS	3	0	0	3	3
3.	19BSS22	Differential Equations and Vector Analysis	BS	3	1	0	4	4
4.	19BSS03	Bio and Nano materials Sciences	BS	3	0	0	3	3
5.	19GES19	Concepts in Product Design	GES	3	0	0	3	3
6.	19GES08	Python Programming	GES	3	0	0	3	3
PRACTICAL								
7.	19GES09	Programming in Python Laboratory	GES	0	0	2	2	1
8.	19GES10	Soft Skills Laboratory	GES	0	0	2	2	1
TotalCredits							**20**	

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SEMESTER–III

Sl. No.	Course Code	CourseName	Category	Hours/Week			Credit	ContactHrs
				L	T	P	C	
1.	19BSS23	Transform and Partial Differential Equations	BS	3	1	0	4	4
2.	19GES24	Digital Principles and System Design	GES	3	0	0	3	3
3.	19GES23	Analog and Digital Communication	GES	3	0	0	3	3
4.	19CYC01	Data Structures	PCC	3	0	0	3	3
5.	19CYC03	Java Programming	PCC	3	0	0	3	3
6.	19CYC05	Computer Networks	PCC	3	0	0	3	3
PRACTICAL								
7.	19GES25	DigitalPrinciplesandSystemDesign Laboratory	GES	0	0	2	2	1
8.	19CYC02	DataStructuresLaboratory	PCC	0	0	2	2	1
9.	19CYC04	JavaProgramming Laboratory	PCC	0	0	2	2	1
TotalCredits								**22**

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SEMESTER–IV

Sl. No.	Course Code	CourseName	Category	Hours/Week			Credit	ContactHrs
				L	T	P	C	
1.	19GES29	WirelessCommunication	GES	3	1	0	3	4
2.	19CYC07	DatabaseManagementSystems	PCC	3	0	0	3	3
3.	19CYC09	CryptographyandNetworksecurity	PCC	3	0	0	3	3
4.	19CYC11	OperatingSystems	PCC	3	0	0	3	3
5.	19CYC13	InformationSecurity	PCC	3	0	0	3	3
6.	19CYC15	IntroductiontoCyberLaws	PCC	3	0	0	3	3
PRACTICAL								
7.	19CYC08	DatabaseManagementSystemsLaboratory	PCC	0	0	2	2	1
8.	19CYC10	CryptographyandNetworksecurityLaboratory	PCC	0	0	2	2	1
9.	19CYC12	OperatingSystemsLaboratory	PCC	0	0	2	2	1
TotalCredits								**22**

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SEMESTER–V

Sl. No.	Course Code	CourseName	Category	Hours/Week			Credit	ContactHrs
				L	T	P	C	
1.	19HSS08	ProfessionalEthicsandHuman Values	HS	3	0	0	3	3
2.	19CYC16	Cybercrimeinvestigationsanddigitalforensics	PCC	3	0	0	3	3
3.	19CYC17	Cloudcomputing	PCC	3	0	0	3	3
4.	19CYC19	Webandmobileapplicationsecurity	PCC	3	0	0	3	3
5.		Elective–I	PEC	3	0	0	3	3
6.		Elective–II	PEC					3
PRACTICAL								
7.	19CYC18	CloudcomputingLaboratory	PCC	0	0	2	2	1
8.	19CYC20	Webandmobileapplication Laboratory	PCC	0	0	2	2	1
9.	19CYE04	SalesforceCRMandplatform Laboratory	PEC	0	0	2	2	1
TotalCredits								**21**

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Department	Cyber Security
Programme	B.E. – Cyber Security

SEMESTER–VI

Sl. No.	Course Code	CourseName	Category	Hours/Week			Credit	ContactHrs
				L	T	P	C	
1.	19CYC21	Wirelesssensornetworksecurity	PCC	3	0	0	3	3
2.	19CYC23	ForensicAnalysisTools	PCC	3	0	0	3	3
3.	19CYC25	DataBaseSecurity	PCC	3	0	0	3	3
4.		ElectiveIII	PEC	3	0	0	3	3
5.		ElectiveIV	PEC	3	0	0	3	3
6.		OpenElectiveI	OEC	3	0	0	3	3
PRACTICAL								
7.	19CYC22	WirelesssensornetworkLaboratory	PCC	0	0	2	2	1
8.	19CYC24	ForensicAnalysisToolsLaboratory	PCC	0	0	2	2	1
9.	19CYC26	DataBaseSecurityLaboratory	PCC	0	0	2	2	1
TotalCredits								**21**

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Department	Cyber Security
Programme	B.E. – Cyber Security

SEMESTER–VII

Sl. No.	Course Code	CourseName	Category	Hours/Week			Credit	ContactHrs
				L	T	P	C	
1.	19CYC27	CyberDefense	PCC	3	0	0	3	3
2.	19CYC28	RiskManagement	PCC	3	0	0	3	3
3.		Elective V	PEC	3	0	0	3	3
4.		Elective VI	PEC	3	0	0	3	3
5.		Open Elective III	OEC	3	0	0	3	3
6.		Open Elective II	OEC	3	0	0	3	3
PRACTICAL								
7.	19CYP01	Projectwork–Phasel	EEC	0	0	6	6	5
		TotalCredits						**23**

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Department	Cyber Security
Programme	B.E. – Cyber Security

SEMESTER–VIII

THEORY

Sl. No.	Course Code	CourseName	Category	Hours/Week			Credit	ContactHrs
				L	T	P	C	
1.		MandatoryCourse(NPTEL)	-	-	-	-	-	-
PRACTICAL								
2.	19CYP02	Projectwork-PhaseII	EEC	0	0	12	18	10
		TotalCredits						**10**

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COURSECOMPONENTSUMMARY

S.No.	Subject Area	CreditsPerSemester								Credits total	Percentage credits
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	3	2			3				8	5
2.	BS	11	10	4						25	15.62
3.	GES	7	8	7	4					26	16.25
4.	PCC			11	18	11	12	6		58	36.25
5.	PEC					7	6	6		19	11.87
6.	EEC							5	10	15	9.37
7.	OEC						3	6		9	5.62
TOTAL		21	20	22	22	21	21	23	10	160	

TotalCredits:160

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Course Code & Course Name	:	19CYC01 & DATA STRUCTURES	L	T	P	C
			3	0	0	3

Course Objectives

1.	The basic structure concept such as Abstract Data Types, Linear and Non Linear Data structures.
2.	The behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graph and their representations.
3.	To choose the appropriate data structure for a specified application
4.	To solve problems using data structures such as array, linked lists, queues, trees graphs, hash tables, search trees.
5.	To analyze various searching and sorting algorithms

Course Outcomes

1.	Identify the appropriate data structure for given pointer and list
2.	Illustrate the problems using stack and queues.
3.	Apply the application of Tree in Data Structure.
4.	Predict the Graph and hashing techniques.
5.	Generalize the problems using various searching and sorting techniques.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
19CYC01.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC01.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC01.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC01.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC01.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I :INTRODUCTION AND LIST — 9

Definition, ADT, Types of Data Structures- Linear &Non Linear Data Structures. Array: Representation of arrays, structure and Pointers, Applications of arrays, structure and Pointer, Dynamic Memory Allocation Functions and Recursion function. Linked List: Definition, Types of List, Singly Linked List operations, Doubly Linked list operation, Circular linked list operation, Applications of linked list.

UNIT II :STACKAND QUEUE — 9

Stack: Stack-Definitions & Concepts, array and Linked implementation of Stack Operations on Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi. Queue: Representation Of Queue, array and Linked implementation of Queue Operations on Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue.

UNIT III: TREE AND BINARY SEARCH TREE — 9

Trees: Basic terminologies of trees – Node, Root, Parent, Child, Link, Sibling, Level, Height, Depth, Leaf, Degree; Binary tree – Full Binary tree, Complete Binary tree; Representation of binary tree – Linear representation, linked representation, Advantages and Disadvantages of both representations; Binary tree traversal – Inorder, Preorder, Postorder traversals; Operations on Binary tree - creation, insertion of left and right child; Tree representation of an arithmetic expression, inorder, Preorder and Postorder expressions from expression tree. Binary Search Tree – Definition, Creation of Binary search tree for a given set of values; Searching for an item – Minimum, Maximum or any given value; Applications of Binary search tree. Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap

UNIT IV :GRAPHS — 9

Definition – Graph terminologies – Directed and Undirected graph, Weighted graph, Adjacent Vertices, Self-loop, Parallel edges, Path, Cycle, in degree, out degree; complete graph, Connected graph; Representation of graph – Set representation – Adjacency matrix representation – Linked representation – Comparison of representations. Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree and Hamiltonian circuit

UNIT V: HASHING, SEARCHING AND SORTING — 9

Hashing: Introduction, Hash table, Hash function, Collision, Collision resolution – separate chaining, open addressing; Rehashing – Extendible hashing. Searching: Definition – Algorithm and Example for sequential search and binary search. Sorting: Definition – Algorithm and Example for selection sort, bubble sort, insertion sort, quick sort, merge sort, radix sort and Heap Sort

Total : 45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	E.Horowitz, S.Sahni Susan Anderson-Freed	Fundamentals of Data structures in C,	Universities Press.	2008
2.	Mark Allen Weiss	Data structure and Algorithm Analysis in C	Pearson India	2012

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	R. F. Gilberg, B. A. Forouzan	Data Structures	2nd Edition, Thomson India	2005
2.	R.Kruse, C.L.Tondo and B.Leung,	Data structures and Program Design in C	2nd Edition Prentice-Hall	2006
3.	A.M.Tanenbaum, Y. Langsam, M.J.Augenstein	Data Structures using C and C++	2nd Edition , PHI Learning	2015
4.	R. Krishnamoorthy	Data Structures Using C	Tata McGraw-Hill Education	2008
5.	E Balagurusamy	Data Structures Using C	Tata McGraw - Hill Education	2013

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Course Code & Course Name	:	19CYC02 & DATA STRUCTURES LABORATRORY	L	T	P	C
			0	0	2	1

Course Objectives

1	Be familiar with C programming
2	Be exposed to implementing abstract data types
3	To use files in real time problems
4	To implement sorting algorithms
5	Construct searching algorithms

Course Outcomes

1	Implementing stacks, queues and linked lists in C Programming
2	Apply the different data structures for implementing solutions to practical problems
3	Formulate the real time problem using traversal ,Graph and Tree
4	Develop searching programs.
5	Create sorting programs

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYC02.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC02.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC02.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC02.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC02.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1	Implement a menu driven program to implement operations on the singly linked list.
2	Implement a menu driven program to implement operations on the doubly linked list
3	Implement a menu driven program to implement operations on the circular linked list
4	Implement a program for stack that performs operations using array
5	Implement a program to convert infix notation to postfix notation using stack.
6	Implement a program to QUEUE using arrays that performs operations
7	Implement a program to stack using linked list.
8	Implement a program to queue using linked list.
9	Implement recursive and non-recursive tree traversing methods ignored, preorder and post-order traversal
10	Implement a program to create and operation on binary search tree.
11	Implement a program to Queue Sort.
12	Implement a program to Merge Sort.
13	Implement a program to Bubble Sort.
14	Implement a program to Binary Search and sequential search.
15	Implement a program to Breadth First search using linked representation of graph
16	Implement a program to Depth first search using linked representation of graph
	Total : 30

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Course Code & Course Name	:	19CYC01 & DATA STRUCTURES	L	T	P	C
			3	0	0	3

Course Objectives

1.	The basic structure concept such as Abstract Data Types, Linear and Non Linear Data structures.
2.	The behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graph and their representations.
3.	To choose the appropriate data structure for a specified application
4.	To solve problems using data structures such as array, linked lists, queues, trees graphs, hash tables, search trees.
5.	To analyze various searching and sorting algorithms

Course Outcomes

1.	Identify the appropriate data structure for given pointer and list
2.	Illustrate the problems using stack and queues.
3.	Apply the application of Tree in Data Structure.
4.	Predict the Graph and hashing techniques.
5.	Generalize the problems using various searching and sorting techniques.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC01.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC01.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC01.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC01.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC01.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I :INTRODUCTION AND LIST — 9

Definition, ADT, Types of Data Structures- Linear &Non Linear Data Structures. Array: Representation of arrays, structure and Pointers, Applications of arrays, structure and Pointer, Dynamic Memory Allocation Functions and Recursion function. Linked List: Definition, Types of List, Singly Linked List operations, Doubly Linked list operation, Circular linked list operation, Applications of linked list.

UNIT II :STACKAND QUEUE — 9

Stack: Stack-Definitions & Concepts, array and Linked implementation of Stack Operations on Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi. Queue: Representation Of Queue, array and Linked implementation of Queue Operations on Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue.

UNIT III: TREE AND BINARY SEARCH TREE — 9

Trees: Basic terminologies of trees – Node, Root, Parent, Child, Link, Sibling, Level, Height, Depth, Leaf, Degree; Binary tree – Full Binary tree, Complete Binary tree; Representation of binary tree – Linear representation, linked representation, Advantages and Disadvantages of both representations; Binary tree traversal – Inorder, Preorder, Postorder traversals; Operations on Binary tree - creation, insertion of left and right child; Tree representation of an arithmetic expression, inorder, Preorder and Postorder expressions from expression tree. Binary Search Tree –

Definition, Creation of Binary search tree for a given set of values; Searching for an item – Minimum, Maximum or any given value; Applications of Binary search tree. Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap		
UNIT IV :GRAPHS		9
Definition – Graph terminologies – Directed and Undirected graph, Weighted graph, Adjacent Vertices, Self-loop, Parallel edges, Path, Cycle, in degree, out degree; complete graph, Connected graph; Representation of graph – Set representation – Adjacency matrix representation – Linked representation – Comparison of representations. Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree and Hamiltonian circuit		
UNIT V: HASHING, SEARCHING AND SORTING		9
Hashing: Introduction, Hash table, Hash function, Collision, Collision resolution – separate chaining, open addressing; Rehashing – Extendible hashing. Searching: Definition – Algorithm and Example for sequential search and binary search. Sorting: Definition – Algorithm and Example for selection sort, bubble sort, insertion sort, quick sort, merge sort, radix sort and Heap Sort		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	E.Horowitz, S.Sahni Susan Anderson-Freed	Fundamentals of Data structures in C,	Universities Press.	2008
2.	Mark Allen Weiss	Data structure and Algorithm Analysis in C	Pearson India	2012

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	R. F. Gilberg, B. A. Forouzan	Data Structures	2nd Edition, Thomson India	2005
2.	R.Kruse, C.L.Tondo and B.Leung,	Data structures and Program Design in C	2nd Edition Prentice-Hall	2006
3.	A.M.Tanenbaum, Y. Langsam, M.J.Augenstein	Data Structures using C and C++	2nd Edition , PHI Learning	2015
4.	R. Krishnamoorthy	Data Structures Using C	Tata McGraw-Hill Education	2008
5.	E Balagurusamy	Data Structures Using C	Tata McGraw - Hill Education	2013

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Course Code & Course Name	:	19CYC02 & DATA STRUCTURES LABORATRORY	L	T	P	C
			0	0	2	1

Course Objectives

1	Be familiar with C programming
2	Be exposed to implementing abstract data types
3	To use files in real time problems
4	To implement sorting algorithms
5	Construct searching algorithms

Course Outcomes

1	Implementing stacks, queues and linked lists in C Programming
2	Apply the different data structures for implementing solutions to practical problems
3	Formulate the real time problem using traversal ,Graph and Tree
4	Develop searching programs.
5	Create sorting programs

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO3
19CYC02.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC02.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC02.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC02.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC02.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1	Implement a menu driven program to implement operations on the singly linked list.
2	Implement a menu driven program to implement operations on the doubly linked list
3	Implement a menu driven program to implement operations on the circular linked list
4	Implement a program for stack that performs operations using array
5	Implement a program to convert infix notation to postfix notation using stack.
6	Implement a program to QUEUE using arrays that performs operations
7	Implement a program to stack using linked list.
8	Implement a program to queue using linked list.
9	Implement recursive and non-recursive tree traversing methods ignored, preorder and post-order traversal
10	Implement a program to create and operation on binary search tree.
11	Implement a program to Queue Sort.
12	Implement a program to Merge Sort.
13	Implement a program to Bubble Sort.
14	Implement a program to Binary Search and sequential search.
15	Implement a program to Breadth First search using linked representation of graph
16	Implement a program to Depth first search using linked representation of graph
	Total : 30

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ourse Name	:	19CYC03 & Java Programming	L	T	P	C
			3	0	0	3

Course Objectives

1.	To develop distributed applications in core Java
2.	To generalize the different protocols used in web
3.	To illustrate about the Bean Development KIT in java
4.	To analyzeserver side programming concepts
5.	To formulate swings

Course Outcomes

1.	Understand the java fundamentals with database connectivity.
2.	Interpret code TCP/IP and RMI
3.	Apply the BDK concepts and swing
4.	DetermineServer side programming using Servlet
5.	Create forms using swing controls and able to do database programming

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC03.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC03.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC03.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC03.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC03.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I :OVERVIEW OF JAVA AND JDBC

Review of object-oriented fundamentals - An overview of Java - Classes – Methods –Constructors – Overloading –Packages and Interfaces - String Handling	9

UNIT II: JDBC

Multithreaded Programming – Exception Handling - JDBC overview - JDBC API – JDBCDrivers -Connection Class - MetaData Function – SQL Fundamentals -SQL Exception – SQLwarning - Statement – Result Se	9

UNIT III: SWINGS

JApplet - Button - Combo - Trees - Tables - Panes - working with Graphics, Color and Font.	9

UNIT IV :SOCKET PROGRAMMING AND RMI

InetAddress - TCP/ IP client sockets - TCP/ IP server sockets - URL - URL Connection – Datagrams - Client/ Server application using RMI.	9

UNIT :V JAVA SERVLETS

Life Cycle of Servlet - Generic Servlet - HTTP Servlet - Reading Initialization Parameters – Reading Servlet Parameters - Cookies - Session Tracking.	9
:	45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Patrick Naughton & Herbert Schildt	The Complete Reference: Java 2	Tata McGraw Hill	1999
2.	Joseph Weber	Using Java 2 Platform	Prentice Hall of India	2000

REFERENCE BOOK

SI.NO	Author(s)	Title of the Book	Publisher	Year of Publications
1.	David Flanagan	Java In A Nutshell, A Desktop Quick Reference	O'REILLY	5th Edition
2.	Kathy Sierra	Head First Java	O' REILLY	2nd Edition
3	Herbert Schildt	Java, A Beginner's Guide	Tata McGraw Hill	5th Edition

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Course Code & Course Name	:	19CYC04 & Java Programming Laboratory	L	T	P	C
			0	0	2	1

Course Objectives

1	To understand the basics of Java
2	To develope Interface and Packages in Java
3	To analyze about Java Applets
4	To determine how to handle mouse events
5	To construct about Layout Managers

Course Outcomes

1	Understand core java concepts for programming.
2	Write programming using Interface and applications of packages
3	Construct GUI using Applets
4	Evaluate program with mouse events.
5	Construct program with different Layout Managers

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC04.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC04.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC04.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC04.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC04.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1	Programs illustrating various data types in Java and class, objects and methods
2	Programs for addition and multiplication of Matrices and manipulate strings
3	Programs illustrating Overloading in Java and illustrating Overriding methods in Java
4	Programs illustrating the implementation of Various forms of Inheritance (Single, Hierarchical, Multilevel)
5	Programs illustrating Exception Handling
6	Programs illustrating Interfaces in Java and Packages in Java
7	Programs illustrating Threads in Java
8	Programs to write applets to draw the various shapes
9	Programs to manipulate labels, lists, text fields and panels
10	Programs to handle mouse events
11	Programs using layout mangers
	Total : 30

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Code & Course Name:	19CYC05&Computer Networks	L	T	P	C
		3	0	0	3

Course Objectives

1. Understanding the basic concepts of computer networking
2. Generalize the MAC protocols
3. Appraise the switching concepts and Routing Techniques
4. Distinguish about UDP & TCP
5. Formulate the Application Layer

Course Outcomes

1. Interpret the functionality and protocols operating in each layer of OSI reference model with topology.
2. Illustrate Various Encoding Technique and its Protocol
3. Analyze error control, flow control and routing protocols
4. Construct IP, TCP and UDP header formats.
5. Determine the Network traffic characteristics and congestion control mechanism.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC05.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC05.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC05.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC05.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC05.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit I : Data Communications — 8

Data Communication – The OSI Model – TCP/IP Protocol Suite – Addressing – Transmission Media – Networking devices – Network Topologies.

Unit II : Data Link Layer — 10

Encoding - Error Detection – Reliable Transmission – MAC protocols – CSMA/CD – CSMA/CA

Unit III : Network Layer — 9

Circuit Switching – Packet Switching – Bridges and LAN Switches: Spanning Tree algorithm – Internetworking – IPv4 - Sub netting – IPv6 – Routing Techniques: Distance vector (RIP) – Link state (OSPF) — Inter-domain Routing (BGP.

Unit IV : Transport Layer — 9

UDP – TCP – Congestion Control and Resource Allocation: TCP Congestion Control – Congestion Avoidance Mechanisms – Quality of Service: Integrated Services – Differentiated Services – Network Traffic Analysis..

Unit V : Application Layer — 9

Domain Name System – Electronic Mail (SMTP, MIME, IMAP) – File Transfer (FTP) – WWW (HTTP).

Total : 45

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Muthayammal Engineering College (Autonomous)
Rasipuram, Namakkal Dist 637 408.

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	Data and Computer Communications	Pearson Education	2013
2.	Behrouz A Forouzan	Data Communications and Networking	Tata McGraw–Hill, New Delhi	2013

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Larry L. Peterson, Bruce S. Davie	Computer Networks: A Systems Approach	Morgan Kaufmann Publishers Inc.,	2011
2.	James F. Kurose, Keith W. Ross	Computer Networking, A Top–Down Approach Featuring the Internet	Pearson Education	2012

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Course Name	:	19CYC06& Computer Organization and Architecture	L	T	P	C
			3	0	0	3

Course Objectives

1. To understand the basic hardware and software issues of computer organization
2. To estimate the arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations
3. To provide the concept of pipelining and hazards
4. To familiarize the students with memory system including virtual memories and cache memories
5. To exposé the students with I/O devices and standard I/O interfaces

Course Outcomes

1. Understand the abstraction of various components of a computer.
2. Design arithmetic and logical unit.
3. Analyze pipelined control units.
4. Evaluate the performance of memory systems.
5. Determine the I/O devices and interfaces

urse Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC06.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC06.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC06.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC06.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC06.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I :INTRODUCTION — 9

Introduction-Technologies for building Processors and Memory-Performance-The Power Wall-Operations of the Computer Hardware-Operands Signed and Unsigned numbers, Representing Instructions, Logical Operations, Instructions for Making Decisions.

UNIT II :ARITHMETIC OPERATIONS — 9

MIPS Addressing for 32-Bit Immediate and Addresses-Parallelism and Instructions: Synchronization, Translating and Starting a Program, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Subword Parallelism, Streaming SIMD Extensions

UNIT III :PIPELINING AND HAZARDS — 9

Building a Datapath-A Simple Implementation Scheme-Overview of Pipelining-Pipelined Datapath-Data Hazards: Control Hazards, Exceptions-Parallelism via Instructions-Instruction Level Parallelism and Matrix Multiply Hardware Design language.

UNIT IV :MEMORY SYSTEM — 9

Memory Technologies-Basics of Caches-Measuring and Improving Cache Performance-Memory hierarchy-Virtual Memory-Secondary storage-Redundant Arrays of Inexpensive Disks-Implementing Cache Controllers

UNIT V :INPUT&OUTPUT ORGANIZATION			9
Accessing I/O Devices-Interrupts-Interrupt Hardware-Enabling and Disabling Interrupts-Handling Multiple Devices-Controlling Device Requests-Exceptions-Direct Memory Access-Buses -Standard I/O Inter faces – PCI Bus, SCSI Bus, USB.			
	Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David A. Patterson and John L. Hennessey	Computer Organization and design	Morgan auffman / lsevier	2014
2.	Smruti Ranjan Sarangi	Computer Organization and Architecture	Tata McGraw Hill	2015

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky	Computer Organization	McGraw-Hill Inc	2012
2.	William Stallings	Computer Organization and Architecture	Pearson Education	2010
3.	Vincent P. Heuring, Harry F. Jordan	Computer System Architecture	Pearson Education	2011
4.	Carl Hamacher, Zvonko Vranesic, Safwat Zaky, and Naraig Manjikian	Computer Organization and Embedded Systems	McGraw Hill Higher Education	2011
5.	John P. Hayes	Computer Architecture and Organization	Tata McGraw Hill	2014

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Course Name	:	19CYC07&Database Management Systems	L	T	P	C
			3	0	0	3

Course Objectives

1.	Understand database requirements and determine the entities involved in the system and their relationships.
2.	Formulate solutions to a broad range of query and data update problems using SQL.
3.	Analyze the basic issues of transaction processing and concurrency control.
4.	Explain and implement the fundamental concepts of a relational database system
5.	Analyze database requirements and determine the entities involved in the system and their relationships.

Course Outcomes

1.	Recoginse ER diagrams for new databases and apply for database applications.
2.	Implement a database schema for a given problem-domain.
3.	Normalize a database with non-loss decomposition.
4.	Apply concurrency control techniques for database transactions.
5.	Design different database access techniques

ourse Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC07.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC07.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC07.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC07.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC07.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I :INTRODUCTION TO DBMS — 9

Database System Applications-Purpose of Database Systems -View of data- Database Languages - Database System Architecture - Data models - Entity-Relationship model - Extended E-R Features - Introduction to relational databases- Keys - Integrity Constraints - Relational Algebra - Fundamental Operations - Additional Operations- Domain Relational Calculus - Tuple RelationalCalculus.

UNIT II :SQL& QUERY OPTIMIZATION — 9

SQL Standards - Data types - Basic Structure of SQL Queries - DDL-DML-DCL-TCL - Views- Advanced SQL - Embedded SQL - Static Vs Dynamic SQL - Query Processing - Query Optimization- Heuristic and Cost based Query Optimization

UNIT III :RELATIONAL DATABASE DESIGN AND TRANSACTIONS — 9

Functional Dependencies - Codd's Rule - Normalization - Non-loss decomposition- 1NF to 5NF - DomainKeyNormalForm–Denormalization -TransactionConcepts-ACIDProperties–Serializability- Concurrency Control - Locking Mechanisms - Two Phase Commit Protocol - Deadlock.

UNIT IV :SYSTEM ARCHITECTURE — 9

Overview of Physical Storage Media - RAID - Tertiary storage - File Organization - Organization of Records in Files - Indexing and Hashing - Ordered Indices - B+ Tree Index Files - B Tree Index Files - Static Hashing - Dynamic Hashing - Distributed Databases - Distributed Data Storage – DistributedTransactions

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UNIT V :DATABASE SECURITY		9
Database Security - Data Classification - Threats and risks - Database Access Control - Types of Privileges - Security of Statistical Databases Parallel Databases- Spatial and Multimedia Databases - Mobile and Web databases - Object Oriented Databases- XMLDatabases.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Abraham Silberschatz, Henry F. Korth	Database System Concepts	Tata McGraw-Hill	2013
2.	Ramez Elmasri Shamkant	Fundamentals of Database Systems	Pearson Education	2011

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Raghu RamakrishnanJohannes Gehrke	Database Management Systems	Tata McGraw-Hill	2014
2.	Hector Garcia-Molina Jeffrey D. Ullman Jennifer	Database Systems: The Complete book	Pearson Education	2013
3.	Shefali Naik	Concepts of Database Management Systems	Pearson Education	2013
4.	G.K.Gupta	Database Management Systems	Tata McGraw Hill	2011
5.	Rob Cornell	Database Systems Design and	Cengage Learning	2011

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Course Name	:	19CYC08&Database Management Systems Laboratory	L	T	P	C
			0	0	2	1

Course Objectives

1.	To create and use a database
2.	Be familiarized with a query language
3.	Experience on DDL Commands
4.	Understanding of DML Commands and DCL commands
5.	Familiarize advanced SQL queries

Course Outcomes

1.	Design database schema for a given problem-domain
2.	Apply the integrity constraints in query using database
3.	Create tables using PL/SQL.
4.	Formulate the reports.
5.	Implement VB as front end and SQL as backend

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYC08.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC08.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC08.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC08.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC08.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	Data Definition Language commands in RDBMS
2.	Data Manipulation Language and Data control Language commands
3.	Apply Integrity constraints and Domain constraints for a Database
4.	Creation of Views, Nested Queries and Join Queries
5.	Study of PL/SQL blocks
6.	High level programming language extensions (Control structures and Procedures)
7.	Implementation of Functions
8.	Implementation of Triggers
9.	Design and Implementation of Banking System
10.	Design and Implementation of Student Information System
11.	Design and Implementation of Payroll Processing System
	Total : 45

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Course Name	:	19CYC09&Cryptography and Network security	L	T	P	C
			2	0	0	1

Course Objectives

1.	To define the OSI security architecture and classical encryption techniques
2.	To demonstrate various block cipher and stream cipher models.
3.	To provide necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks
4.	To estimate the principles of public key cryptosystems, hash functions and digital signature
5.	To create the techniques used for message authentication and confidentiality maintenance

Course Outcomes

1.	Understand the fundamentals of networks security, security architecture, threats and Vulnerabilities.
2.	Apply the different cryptographic operations of symmetric cryptographic algorithms.
3.	Analyze the different cryptographic operations of public key cryptography.
4.	Evaluate the various Authentication schemes to simulate different applications.
5.	Design various Security practices and System security standards.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC09.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC09.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC09.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC09.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC09.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit I : Introduction — 9

Computer Security Concepts - OSI Security Architecture - Security Attacks - Services - Mechanisms - Model for Network Security - Classical Encryption Techniques: Symmetric Cipher Model, Substitution: Ceaser cipher, Playfair cipher, Hill Cipher, Vigenere cipher, Vernam cipher - Transposition Techniques: Rail fence, Row and Column Transposition - Steganography.

Unit II : Symmetric Key Cryptography — 9

Number Theory and Finite Fields: The Euclidean Algorithm, Modular Arithmetic, Groups, Rings, and Fields - Traditional Block Cipher Structure - Data Encryption Standard, The Strength of DES - Advanced Encryption Standard - Block Cipher Operation

Unit III : Asymmetric Ciphers — 9

Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Primality Testing, The Chinese Remainder Theorem, Public-Key Cryptography: Principles of Public-Key Cryptosystems, The RSA Algorithm - Diffie-Hellman Key Exchange-Elliptic Curve Arithmetic - Elliptic Curve Cryptography

Unit IV : Data Integrity Algorithms and Mutual Trust — 9

Authentication requirement - Authentication function - MAC - Hash function - Security of hash function and SHA –MD5 - Digital Signatures: DSS - Elgamal Digital Signature Scheme - Key Management and Distribution: X.509 Certificates - Kerberos.

Unit V : Internet and System Security — 9

Electronic Mail security - PGP- IP security - Web Security: SSL - SET- System Security: Malicious Software - Intruders - Firewalls.

Total : 45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William Stallings	Cryptography and Network Security: Principles and Practice	Pearson Education	2014
2.	Atul Kahate	Cryptography and Network Security	Tata McGraw Hill	2013

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	CharlesB. Pfleeger, Shari Lawrence P fleeger	Security in Computing	Pearson Education	2011
2.	Behrouz A.Foruzan	Cryptography and Network Security	Tata McGraw Hill	2007
3.	William Stallings	Cryptography and Network security Principles and Practices	Pearson Education	2006
4.	Javier López, Gene T sudik	Applied Cryptography and Network Security	Springer	2011
5.	Niels Ferguson	Cryptography Engineering: Design Principles and Practical Applications	JohnWiley	2010

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Course Name	:	19CYC10&CRYPTOGRAPHY AND NETWORK SECURITY LAB	L	T	P	C
			0	0	2	1

Course Objectives

1.	To learn different cipher techniques
2.	Develop the Various Security Algorithm
3.	To study network security tools and vulnerability assessment tools
4.	To generate different open source tools for network security and analysis
5.	Create the network security system

Course Outcomes

1.	Develop code for classical Encryption Techniques to solve the problems
2.	Build cryptosystems by applying symmetric and public key encryption algorithms
3.	Construct code for authentication algorithms
4.	Develop a signature scheme using Digital signature standard
5.	Demonstrate the network security system using open source tools

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYC10.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC10.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC10.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC10.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC10.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	Perform encryption, decryption using the following substitution techniques (i) Ceaser cipher, (ii) Playfair cipher iii) Hill Cipher iv) Vigenere cipher
2.	Perform encryption and decryption using following transposition technique - Row & Column Transformation
3.	Implement the practical applications for the following algorithm DES
4.	Implement the practical applications for the following algorithm AES
5.	Implement RSA Algorithm using HTML and JavaScript
6.	Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
7.	Implement the (i) Message Digest Algorithm – MD5 (ii) Secure Hash Algorithm – SHA 1
8	Implement the SIGNATURE SCHEME - Digital Signature Standard.
9	Setup a Honey Pot and Monitor the Honeypot on Network
10	Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w
	Total : 30

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Course Name	:	19CYC11&Operating Systems	L	T	P	C
			3	0	0	3

Course Objectives

1.	To understand the basic concepts Operating System.
2.	To understand the fundamental Operating System abstractions such as processes, process scheduling
3.	To understand the principles of concurrency and synchronization, and apply them to write concurrent programs/software
4.	To Implement basic resource management techniques (scheduling or time management, space management) and principles
5.	To describe the types of I/O management, disk scheduling, disk management and swap space management

Course Outcomes

1.	Enumerate structures of Operating System.
2.	Apply fundamental Operating System abstractions such as processes, process scheduling, Semaphores, IPC abstractions, shared memory regions, deadlock and threads.
3.	Illustrate the principles of concurrency and synchronization and apply them to write concurrent programs/software.
4.	Implement basic resource management techniques (scheduling or time management, space management) and principles
5.	Recognize the file system concept and storage management

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
19CYC11.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC11.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC11.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC11.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC11.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I: INTRODUCTION — 9

Introduction – What Operating System Do – Operating System Structure – Operating system Operations – Operating System Components: Process Management – Memory Management – Storage Management – I/O Management – Network Management - Protection and Security.

Classes of Operating Systems: Mainframe Systems – Single Processor System - Multiprocessor Systems - Desktop Systems — Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems - Open Source Operating Systems.

Operating System Structures: Operating System Services – User and Operating System Interface – System Calls– Types of System Calls.

UNIT II :PROCESS MANAGEMENT AND THREADING — 9

Processes: Process concept – Process scheduling – Operation on Processes - Inter-process Communication: Shared Memory Systems - Message Passing Systems.

Process Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms: First-Come, First-Served – Priority – Round-Robin – Multilevel Queue – Multilevel Feedback Queue.

Threads: Overview – Multithreading models - Threading issues..

UNIT III :PROCESS SYNCHRONIZATIONAND DEADLOCKS — 9

Process Synchronization: Background - The critical-section problem (Software based solution and hardware based solution) – Semaphores – Classic Problems of Synchronization – Monitors.

Deadlocks: System model - Deadlock Characterization – Methods for Handling Deadlocks -Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlocks.

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UNIT IV : MEMORY MANAGEMENT	9
Management Strategies: Background – Swapping – Memory allocation: Contiguous Memory Allocation –Non-Contiguous Memory Allocation: Segmentation - Paging – Segmentation with Paging - Structure of the Page Table. **Virtual Memory:** Background - Demand Paging – Page Replacement – Allocation of Frames – Thrashing.	
UNIT V :FILE SYSTEM AND STORAGE MANGEMENT	9
System Interface: File Concept – Access Methods – Directory and Disk Structure – Protection. **File System Implementation:** File System Structure – File System Implementation – Directory Implementation - Allocation Methods – Free Space Management. **Mass Storage Structure:** Overview of Mass Storage Structure – Disk Structure - Disk Scheduling – Disk Management - Swap Space Management. **Case Study**: Windows, Linux and Android operating Systems	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,	Operating System Concepts	John Wiley & Sons (ASIA) Pvt. Ltd, 9th Edition	2015
2.	Harvey M. Deitel	Operating Systems	Pearson Education, 3rd Edition.	2007

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Andrew S. Tanenbaum	Modern Operating Systems	Prentice Hall of India,	2009
2	William Stallings	Operating Systems: Internals and Design Principles	Prentice Hall of India,	2009
3	D M Dhamdhere	Operating Systems: A Concept-Based Approach	Tata Mc-graw Hill Publishing	2012
4	Charles Crowley	Operating System: A Design-Oriented Approach	Tata Mc-graw Hill Publishing,	2009
5	Evi Nemeth , Garth Snyder, Trent R. Hein , Ben Whaley , Dan Mackin	UNIX and Linux System Administration Handbook	Prentice Hall of India,	2010

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Course Name	:	19CYC12&Operating Systems Laboratory	L	T	P	C
			0	0	2	1

Course Objectives

1.	Shell programming and the use of filters in the UNIX environment.
2.	Exposed to programming in C using system calls.
3.	To use the file system related system calls.
4.	To process creation and inter process communication.
6.	Implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock

Course Outcomes

1.	Implement deadlock avoidance, and Detection Algorithms
2.	Compare the performance of various CPU Scheduling Algorithm
3.	Analyze the performance of the various page replacement algorithms
4.	Create processes and implement IPC
5.	Develop various algorithms for CPU scheduling and for deadlock avoidance

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYC12.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC12.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC12.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC12.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC12.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	File exploring basic commands under Linux Operating systems
2.	Program using Shell scripts.
3.	Basic process management algorithms.
4.	Process synchronization algorithms.
5.	Implementing various memory allocation methods.
6.	Implementing paging and segmentation
7.	Implementing various page replacement policies
8	Implementation of file system calls.
9	Implementation of Pattern matching.
10	Implementation of disk scheduling algorithms.
	Total : 30

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Course Name	:	19CYC13&Information security	L	T	P	C
			3	0	0	3

Course Objectives

1.	To understand the basics of information security.
2.	To describe the legal, ethical and professional issues in information security.
3.	To estimate the level of security risk faced by an organization and the counter measures to handle the risk.
4.	To understand the logical design and security models.
5.	To implement the physical design and implementation of information security

Course Outcomes

1.	Explore the basic concept of information security models.
2.	Analyze the need for security issues.
3.	Use the security policies for information security.
4.	Design logical structure of the information systems.
5.	Implement physical structure of information security system by using security tools

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC13.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC13.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC13.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC13.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC13.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I :INTRODUCTION — 9

Introduction to Information Security: History- Aspects of Security- NSTISSC Security Model, Components of Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II :SECURITY INVESTIGATION — 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III :SECURITY PRACTICE — 9

Vulnerability Analysis-Auditing-Anatomy of an Auditing System-Design of Auditing Systems-Auditing Mechanisms-Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk.

UNIT IV :LOGICAL DESIGN — 9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V :PHYSICAL DESIGN AND IMPLEMENTATION — 9

Security Technology, IDS, Honey Pots, Honey Nets, and Padded Cell Systems, Scanning and Analysis Tools, Access Control Devices, Implementing Information Security, Project Management for Information Security, Technical Topics of Implementation, Nontechnical Aspects of Implementation

Total : 45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Michael E Whitman and Herbert J Mattord	Principles of Information Security	Thomson (Cengage) Indian	2016
2.	Mark Rhodes-Ousley	Information Security: The Complete Reference	Pearson/PHI	2013

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Stuart Mc Clure, Joel Scrambray, George Kurtz	Hacking Exposed	Tata McGraw-Hill	2003
2.	Micki Krause, Harold F. Tipton	Handbook of Information Security Management	CRC Press LLC	2004
3.	Charles Pfleeger,Shari Lawrence Pfleeger,Devin N Paul	Security in Coding	Pearson Education	2007
4.	Wenbo Mao	Modern Cryptography Theory and Practice	Pearson Education	2004
5.	Matt Bishop	Computer Security: Art and Science	Pearson Education	2003

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Rasipuram, Namakkal Dist 637 408.

Course Name	:	19CYC14 -DIGITAL FORENSICS	L	T	P	C
			3	0	0	3

Course Objectives

1	The fundamentals and importance of digital forensics.
2	Digital investigation in an organized and systematic way.
3	Analysis the data acquisition methods.
4	Discriminate on Digital Forensics.
5	Develop computer forensic tools.

Course Outcomes

1	Understand the concepts of digital forensics.
2	Analyze investigation process.
3	Interpret the inner workings of file systems.
4	Design data acquisition methods
5	Apply various forensic tools

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC14.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC14.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC14.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC14.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC14.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Introduction

Computer forensics fundamentals- Benefits of forensics-computer crimes-computer forensics evidence and courts- legal concerns and private issues.	9

Unit-II : Computing Investigations

Understanding Computing Investigations – Procedure for corporate High-Tech investigations-understanding data recovery work station and software- conducting and investigations.	9

Unit-III : Data Acquisition

Data acquisition- understanding storage formats and digital evidence- determining the best acquisition method, acquisition tools- validating data acquisitions-performing RAID data acquisitions- remote network acquisition tools- other forensics acquisitions tools	9

Unit-IV : Processing Crimes

Processing crimes and incident scenes-securing a computer incident or crime-seizing digital evidence at scene-storing digital evidence-obtaining digital hash-reviewing case.	9

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Unit-V : Current Computer Forensic Tools		
Current computer forensics tools- software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations- investigating email crime and violations, understanding E-Mail servers, specialized E-Mail forensics tool.		9
	:	45

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	**Karlstad**, Joakim	Fundamentals of Digital Forensics	Springer	2018
2.	Anders Flaglien, Inger Marie Sunde,AusraDilijonaite	Digital Forensics	John Wiley & Sons,	2017

REFERENCE BOOK

SI.NO	Author(s)	Title of the Book	Publisher	Year of Publications
1.	**Michael Hale Ligh, Andrew Case**	The Art of Memory Forensics	Wiley	2014
2.	Jack Wiles Anthony Reyes	The best damn cybercrime and digital forensics	Syngress	2007
3	Sharma, S.R	Dimensions Of Cyber Crime	Annual Publications Pvt. Ltd., 1st Edition	2004

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Course Name	:	19CYC15 -INTRODUCTION TO CYBER LAWS	L	T	P	C
			3	0	0	3

Course Objectives

1	The basics concepts of Cyber evolution and computer technology
2	Illustrate the Information Technology in current trends
3	Understand of concepts of Cyber Law
4	Develop the security in business
5	Formulate cybercrime concepts

Course Outcomes

1	Explain the concepts of Cyberspace.
2	Analyze the various Information Technology Act
3	To Understand basics of Cyber Law related with legislation
4	Design Security in cyber space
5	Apply Various Case Studies on Real Time Crimes.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC15.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC15.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC15.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC15.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC15.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : Introduction To Cyber Law Evolution Of Computer Technology

Emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.	9

Unit-II :Information Technology Act

Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication	9

Unit-III :Cyber Law And Related Legislation

Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR)	9

Unit-IV :Electronic Business And Legal Issues		
Evolution and development in Ecommerce, paper vs paper less contracts E-Commerce models- B2B, B2C,E security. Application area: Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.		9
Unit-V :Case Study On Cyber Crimes		
Harassment Via E-Mails, Email Spoofing (Online A Method Of Sending E-Mail Using A False Name Or E-Mail Address To Make It Appear That The E-Mail Comes From Somebody Other Than The True Sender, Cyber Pornography (Exm.MMS),Cyber-Stalking		9
	:	45

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	K.Kumar	Cyber Laws: Intellectual property & E Commerce, Security"	, Dominant Publisher,	2011
2.	Rodney D. Ryder	Guide To Cyber Laws	Second Edition, Wadhwa And Company,	2007

REFERENCE BOOK

SI.NO	Author(s)	Title of the Book	Publisher	Year of Publications
1.	Vakul Sharma,	Handbook Of Cyber Laws	Macmillan India Ltd, 2 ndEdition,PHI,	2003
2.	Justice Yatindra Singh,	Cyber Laws	Universal Law Publishing, 1 stEdition,New Delhi	2003
3	Sharma, S.R	Dimensions Of Cyber Crime	Annual Publications Pvt. Ltd., 1st Edition	2004

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Course Name	:	19CYC16 -CYBER CRIME INVESTIGATIONS AND DIGITAL FORENSICS	L	T	P	C
			3	0	0	3

Course Objectives

1	To understand the forensic concepts
2	To learn computer basics
3	To Identify methodology of Computer Forensics
4	To learn Forensics tools concepts
5	To understand working principle of Electronic evidence

Course Outcomes

1	Analyze difference between computer crime and cyber crime
2	Explain basics concepts in computer
3	Develop the security
4	Apply various forensics tools
5	Explain electronic evidence process

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC16.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC16.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC16.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC16.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC16.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Cyber Crime and computer crime

Introduction to Digital Forensics- Definition and types of cybercrimes- electronic evidence and handling-electronic media-collection-searching and storage of electronic media- introduction to internet crimes-hacking and cracking-credit card and ATM frauds-web technology- cryptography-emerging digital crimes and modules	9

Unit-II : Basics of Computer

Computer organization, components of computer- input and output devices, CPU, Memory hierarchy, types of memory, storage devices, system soft wares, application soft wares, basics of computer languages.	9

Unit-III : Computer Forensics

Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Systems-FAT12, FAT16, FAT32 and NTFS, UNIX file Systems, mac file systems, computer artifacts, Internet Artifacts, OS Artifacts and their forensic applications	9

Unit-IV : Forensic Tools

Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability Assessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information.	9

Unit-V : Processing of Electronic Evidence

Process of computer forensics and digital investigations, processing of digital evidence, digital images, damaged SIM and data recovery, multimedia evidence, retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files.	9
:	45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	C. Altheide& H. Carvey	Digital Forensics with Open Source Tools	Syngress	2011
2.	Aaron Philipp,David Cowen	Hacking Exposed Computer ForensicsComputer Forensics	Pearson	2012

REFERENCE BOOK

SI.NO	Author(s)	Title of the Book	Publisher	Year of Publications
1.	Jack Wiles Anthony Reyes	The best damn cybercrime and digital forensics	Syngress	2007
2.	Sharma, S.R	Dimensions Of Cyber Crime	Annual Publications Pvt. Ltd., 1st Edition	2004
3	Anders Flaglien, Inger Marie Sunde,AusraDilijonaite	Digital Forensics	John Wiley & Sons,	2017

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Course Code & Course Name	:	19CYC17 -CLOUD COMPUTING	L	T	P	C
			3	0	0	3

Course Objectives

1.	Describe three cloud deployment models, and Overview of AWS Global infrastructure.
2.	Understand the different AWS core services.
3.	Formulate virtual firewalls with security groups.
4.	Review the availability differences of alternative database solutions.
5.	Summarize the AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes

1.	Construct three cloud deployment models, and Overview of AWS Global infrastructure.
2.	Implement the different AWS compute services.
3.	Create virtual firewalls with security groups.
4.	Construct the availability of different alternative database solutions.
5.	Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC17.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC17.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC17.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC17.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC17.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : Cloud Concepts — 9

Cloud Concepts Overview - Introduction to Cloud Computing, Advantages of Cloud Computing, CC Reference Model, Introduction to Amazon Web Services (AWS), AWS Cloud Adoption Framework (CAF). Cloud Economics - Fundamentals of Pricing, Total Cost of Ownership, AWS Global Infrastructure Overview - AWS Global Infrastructure, AWS Service and Service Category Overview.

Unit-II :Aws Core Services — 9

Compute - Compute Services Overview, Introduction to Amazon Elastic Compute Cloud (EC2), Amazon EC2 Cost Optimization, Introduction to AWS Lambda, Introduction to AWS Elastic Beanstalk. Storage - Amazon Elastic Block Store (EBS), Amazon Simple Storage Service (S3), Amazon Elastic File System (EFS), Amazon Glacier. VPC - Amazon Virtual Private Cloud (VPC), Amazon VPC Security Groups, Amazon CloudFront,.Database - Amazon Relational Database Service (RDS), Amazon DynamoDB, Amazon Redshift, Amazon Aurora. Balancing, Scaling, Monitoring - Elastic Load Balancing (ELB), Amazon CloudWatch, Auto Scaling.

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Unit-III :Cloud Security		9
AWS Shared Responsibility Model, AWS Identity and Access Management (IAM), AWS Trusted Advisor, AWS CloudTrail, AWS Config, AWS Day One Best Practice Review, AWS Security and Compliance Programs, AWS Security Resources.		
Unit-IV :Cloud Architecting		9
Introduction to the Well-Architected Framework, Well-Architected Design Principles, Understanding Reliability and High Availability.		
Unit-V :Cloud Support		9
Introduction to AWS Organizations, AWS Cost Explorer, Overview of AWS Technical Support Plans and Costs, Microsoft azure, Google app Engine.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	KaiHwang, GeoffreyCFox, JackGDongarra	DistributedandCloud ComputingFrom ParallelProcessingtotheInternetofThings	MorganKaufmann Publishers	2012
2.	RajkumarBuyya, Christian Vecchiola,SThamarai Selvi	MasteringCloud Computing	TataMcGrawHill	2010

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	JohnW.RittinghouseAndJames F.Ransome	CloudComputing: Implementation, Management,andSecurity	CRCPress	2010
2.	Bernard Golden	Amazon Web Service For Dummies	John Wiley & Sons, Inc	2013
3.	Mitch Tulloch with the Windows Azure Team	Introducing Windows Azure	Microsoft Press	2013
4.	BarrieSosinsky	CloudComputingBible	WileyIndia	2015
5.	GautamShroff	EnterpriseCloud Computing	Cambridge	2010

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Course Code & Course Name	:	19CYC18 -CLOUD COMPUTING LABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	To understand and study Amazon EC2
2.	To work with EBS.
3.	To build VPC, web server and DB server
4.	To build the DB Server.
5.	To construct scale and load balance of cloud architecture.

Course Outcomes

1.	Construct Amazon EC2
2.	Working with EBS
3.	Develop VPC, web server and DB server
4.	Build the DB Server.
5.	Implement scale and load balance of cloud architecture.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC18.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC18.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC18.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC18.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC18.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	Introduction to Amazon EC2
2.	Working with EBS
3.	Build VPC and Launch a Web Server
4.	Build DB Server and Interact with DB Using an App
5.	Scale and Load Balance Architecture
6.	Introduction to AWS IAM
7.	Use GAE launcher to launch the web applications.
8.	Simulate a Cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
9.	Install Hadoop single node cluster and run simple applications like wordcount.
10.	Install Virtual box/VMware Workstation with different flavors of Linux or windows OS on top of windows7 or 8.

Total : 30

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Course Code & Course Name	:	19CYC19 - MOBILE APPLICATION DEVELOPMENT	L	T	P	C
			3	0	0	3

Course Objectives

1.	Tolearnthecharacteristicsofmobileapplications
2.	UnderstandtheintricaciesofUIrequiredbymobileapplications
3.	Tostudyaboutthedesignaspectsofmobileapplication
4.	Tolearndevelopment andprogrammingofmobileapplications.
5.	Describe app development tools

Course Outcomes

1.	Implement the userinterfacesofmobileapplications.
2.	Designthemobileapplicationsthatisawareoftheresourceconstraintsofthemobiledevices.
3.	Applyadvancedmobileapplicationsthataccessesthedatabasesandtheweb.
4.	Explain programming basics for Application
5.	Developusefulmobileapplicationsinthecurrentscenario usingGoogleAndroidandEclipse simulator

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC19.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC19.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC19.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC19.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC19.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : Introduction — 9

Mobile Applications–CharacteristicsandBenefits–Application Model – Infrastructure and Managing Resources – Mobile Software Engineering–FrameworksandTools–Mobile devicesProfiles

Unit-II : User Interface — 9

GenericUIDevelopment–VUIsandMobileApplications – Text to Speech techniques – Designing the right UI – Multimodaland Multichannel UI – Gesture based UIs – Screen Elements and Layouts – VoiceXML–JavaAPI.

Unit-III :Application Design — 9

Memory Management – Design patterns for limited memory – Work flow for Application Development – Techniques for composing Applications – Dynamic Linking – Plug ins and rules of thumb for using DLLs –ConcurrencyandResource Management–Lookandfeel.

Unit-IV :Application Development — 9

IntentsandServices–StoringandRetrievingdata–CommunicationviatheWeb–NotificationandAlarmsGraphics and Multimedia – Telephony – Location based services – Packaging and Deployment–SecurityandHacking.

Unit-V :Tools — 9

Google Android Platform – Eclipse Simulator – Android Application Architecture – Event based programming – Apple iPhone Platform – UI tool kit interfaces– Eventhandlingand Graphicsservices– LayerAnimation

Total : 45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	ZigurdMednieks, LairdDornin,	ProgrammingAndroid	O'Reilly,	2011
2.	RetoMeier	ProfessionalAndroid2ApplicationDevelopment	WroxWiley	2010

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	AlasdairAllan	iPhoneProgramming	O'Reilly	2010
2.	Wei-Meng Lee	BeginningiPhone SDK Programming with Objective-C	Wrox Wiley	2010
3.	Poslad	UbiquitousComputing:SmartDevices,EnvironmentsandInteractions	Wiley	2009

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Course Code & Course Name	:	19CYC20 -MOBILE APPLICATION DEVELOPMENT LABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	Toknowaboutvariousplatformsandtoolsavailable fordevelopingmobileapplications
2.	Torealizethedifferencesbetweendevelopingconventionalapplicationsand mobileapplications.
3.	Tolearnprogrammingskills inJ2MEandAndroidSDK
4.	Tostudyaboutmicrobrowserbasedapplicationstoaccessthe InternetusingSunJavaToolkit.
5.	To learn creating database application using various tools

Course Outcomes

1.	Install and configure Android application development tools.
2.	Develop user Interfaces for the Android platform
3.	Save state information across important operating system events.
4.	Apply Java programming concepts to Android application development.
5.	Design Application for Data base

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC20.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC20.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC20.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC20.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC20.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	To study Android Studio and android studio installation. Create "Hello World" application..
2.	To understand Activity, Intent, Create sample application with login module.(Check username and password).
3.	Design simple GUI application with activity and intents e.g. calculator.
4.	Develop an application that makes use of RSS Feed.
5.	Write an application that draws basic graphical primitives on the screen
6.	Create an android app for database creation using SQLite Database.
7.	Develop a native application that uses GPS location information
8.	Implement an application that writes data to the SD card
9.	Design a gaming application
10.	Create an application to handle images and videos according to size

Total : 30

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Course Code & Course Name	:	19CYC21 -WIRELESSCOMMUNICATIONS AND NETWORKS	L	T	P	C
			3	0	0	3

Course Objectives

1.	Tostudythe ChannelplanningforWirelessSystems
2.	Tostudy the MobileRadio Propagation
3.	TolearntheEqualizationandDiversity
4.	TounderstandtheEqualizationandDiversity
5.	To learntheWirelessNetworks

Course Outcomes

1.	UnderstandCellular communicationconcepts
2.	Analyzethemobile radio propagation
3.	Apply various multiple schemes used in wireless communication
4.	Explain wireless wide area network and their performance analysis
5.	Demonstrate Wireless local area networks and their specifications

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC21.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC21.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC21.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC21.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC21.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : The Cellular Concept-System Design Fundamentals — 9

Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for WirelessSystems,AdjacentChannelinterference,PowerControlforReducinginterference,Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring.

Unit-II :Mobile Radio Propagation: Large-Scale Path Loss — 9

Introduction to Radio Wave Propagation, FreeSpacePropagationModel,RelatingPowertoElectricField,TheThreeBasicPropagationMechanisms,Reflection-ReflectionfromDielectrics,BrewsterAngle,Reflectionfromprefectconductors,GroundReflection(Two-Ray)Model,Diffraction-FresnelZoneGeometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model,Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and BertoniModel, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor),Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model,AttenuationFactorModel,Signalpenetrationintobuildings,RayTracingandSiteSpecificModeling.

Unit-III :MobileRadioPropagation: Small–ScaleFadingandMultipath — 9

SmallScaleMultipathpropagation-Factors influencing small scale fading, Dopplershift, Impulse Response Modelofamultipath channel-RelationshipbetweenBandwidthandReceived power,Small-Scale MultipathMeasurements-DirectRF Pulse System,Spread SpectrumSliding CorrelatorChannelSounding,Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time DispersionParameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types ofSmall-ScaleFading-Fading effects Due to Multipath Time Delay Spread, Flat fading,

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Frequency selective fading,Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath FadingChannels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model,Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray RayleighFading Model.

Unit-IV :Equalization and Diversity	**9**

Introduction, Fundamentals of Equalization, Training A Generic AdaptiveEqualizer,Equalizers incommunicationReceiver,LinearEqualizers,NonlinearEqualization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer,Algorithmsforadaptiveequalization-ZeroForcingAlgorithm,LeastMeanSquareAlgorithm,Recursiveleastsquaresalgorithm.DiversityTechniques-DerivationofselectionDiversityimprovement,DerivationofMaximalRatioCombiningimprovement,PracticalSpaceDiversityConsideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, EqualGainCombining,PolarizationDiversity,Frequency Diversity,TimeDiversity,RAKE Receiver.

Unit-V :Wireless Networks	**9**

Introduction to wireless Networks, Advantages and disadvantages of WirelessLocal Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium AccessControl, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements,WirelessPANs,HiperLan,WLL.

Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Theodore, S.Rappaport	WirelessCommunications Principles and Practice	2nd Ed.,PHI.	2002
2.	GottapuSasibhushanaRao	MobileCellularCommunication	PearsonEducation	2012

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	KamiloFeher	WirelessDigitalCommunications	PHI.	1999
2.	WilliamStallings	WirelessCommunicationandNetworking	PHI	2003
3.	AndreaGoldsmith	WirelessCommunications	CambridgeUniversityPress	2005

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Course Code & Course Name	:	19CYC22 -WIRELESSCOMMUNICATIONS ANDNETWORKS LABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	To study digital modulation concepts
2.	To learn various Encoder and Decoder techniques
3.	To study the MAT Lab software
4.	To learn the concept of transmitter, receiver and frequency in mobile handset
5.	To study theNetsimsoftware

Course Outcomes

1.	Implement theadvanceddigitalmodulationtechniques
2.	DesignConvolutionalencoderanddecoderforerrorcontrolcodingtechniques.
3.	CalculatepathlossforFree space,Okumura and Hatamodelsforoutdoorpropagation.
4.	ComprehendCellularconceptsofGSMandCDMAnetworks.
5.	SimulateRAKEreceiverforCDMA withMATLAB.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC22.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC22.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC22.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC22.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC22.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	FSKModulationand Demodulationtechnique
2.	QPSKModulation and Demodulationtechnique
3.	DQPSKModulation and Demodulationtechnique
4.	8-QAMModulationandDemodulationtechnique.
5.	ImplementationofConvolutional EncoderandDecoder
6.	SimulationofAdaptiveLinearEqualizerusingMATLABsoftware
7.	MeasurementofcallblockingprobabilityforGSM&CDMAnetworksusingNetsimsoftware.
8.	StudyofGSMhandsetforvarious signaling andfaultinsertiontechniques(MajorGSMhandsetsections:clock,SIMcard,charging,LCDmodule,Keyboard,User interface).
9.	Studyoftransmitterandreceiversectioninmobilehandsetandmeasurefrequency
10.	SimulationofRAKEReceiverfor CDMAcommunicationusingMATLAB software
	Total : 30

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Course Code & Course Name	:	19CYC23 - COMPUTER FORENSIC	L	T	P	C
			3	0	0	3

Course Objectives

1.	To understand the concepts of cyber crime
2.	To study the basic concepts of computer
3.	To learn computer forensics
4.	To become familiar with forensics tools
5.	To learn to analyze and validate forensics data

Course Outcomes

1.	Implement real-world hacking techniques to test system security
2.	Understand the basics of computer software
3.	Apply a number of different computer forensic tools to a given scenario
4.	Identify the vulnerabilities in a given network infrastructure
5.	Analyze and validate forensics data

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC23.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC23.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC23.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC23.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC23.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I: CyberCrimeandcomputercrime	9
Introduction to Digital Forensics, Definition and types of cybercrimes, electronic evidence and handling,electronic media, collection, searching and storage of electronic media, introduction to internet crimes,hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimesand modules.	
Unit-II: BasicsofComputer	9
Computer organization, components of computer- input and output devices, CPU, Memory hierarchy, typesofmemory,storage devices,systemsoft wares,applicationsoft wares,basics ofcomputer languages.	
Unit-III: ComputerForensics	9
Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Systems-FAT12,FAT16, FAT32 and NTFS, UNIX file Systems, mac file systems,computer artefacts, Internet Artefacts, OSArtifactsandtheirforensicapplications	
Unit-IV: Forensic ToolsandProcessingofElectronicEvidence	9
Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, VulnerabilityAssessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information,process of computer forensics and digital investigations, processing of digital evidence, digital	

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images,damagedSIManddatarecovery,multimediaevidence,retrievingdeleteddata:desktops,laptopsandmobiles,retrieving data fromslackspace,renamed file, ghosting, compressediles.			
Unit-V: Analysis and Validation			9
Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics			
	Total	:	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart,	Computer Forensics and Investigations	Cengage Learning, India Edition	2016
2.	Pradeepk,Sinhapritisinh	Computer Fundamentals	BPB	2015.

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	John R.Vacca,	Computer Forensics	Cengage Learning	2005
2.	MarjieT.Britz	Computer Forensics and Cyber Crime: An Introduction	3rd Edition, Prentice Hall,	2013.
3.	Kenneth C.Brancik	Insider Computer Fraud	Auerbach Publications Taylor & Francis Group	2008

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Course Code & Course Name	:	19CYC24 - COMPUTER FORENSICLABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	To learn Image retrieval techniques
2.	To study the computer forensic tools
3.	To learn how to secure our data
4.	To study Autospysoftware to investigation process
5.	To understand the data recovering concepts

Course Outcomes

1.	Implement image retrieval techniques
2.	Apply various computer forensic tools in real time
3.	Analyze the techniques of data security
4.	Develop secure Application using Auto spy
5.	Explain data recovering techniques

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC24.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC24.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC24.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC24.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC24.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	StudyofComputerForensicsanddifferenttoolsusedforforensicinvestigation
2.	How toRecoverDeletedFilesusingForensicsTools
3.	Studythestepsforhiding andextractanytext filebehind animagefile/Audio file using Command Prompt.
4.	How toExtractExchangeableimagefileformat(EXIF)DatafromImage Files using ExifreaderSoftware
5.	How to make the forensic image of the hard drive using EnCaseForensics.
6.	How toRestoringtheEvidenceImageusingEnCaseForensics
7.	How toCollectEmailEvidencein VictimPC
8.	How toExtractingBrowserArtifacts
9.	ComparisonoftwoFilesforforensicsinvestigationbyCompareITsoftware
10.	LiveForensicsCaseInvestigation usingAutopsy

Total : 45

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Course Code & Course Name	:	19CYC25 -WEB SERVICES	L	T	P	C
			3	0	0	3

Course Objectives

1.	To LearnthebasicsofXMLtechnology.
2.	To Understandthebackgroundofdistributedinformationsystem
3.	To Learnthesecurityfeaturesofweb servicesand servicecomposition.
4.	To learn concepts of semantic web services
5.	To understand techniques of web services

Course Outcomes

1.	Create, validate, parse,andtransformXMLdocuments.
2.	Designa middlewaresolutionbasedapplication.
3.	Developwebservicesusingdifferenttechnologies
4.	Composesetofcomplexwebservices
5.	Apply web services techniques for security

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC25.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC25.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC25.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC25.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC25.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : DistributedInformationSystem — 9

Distributedinformationsystem– Design of IB–Architecture of IB –Communication in an IS – MiddlewareRPC – TP monitors – Objectbrokers – Message oriented middleware – EAI –EAI Middleware – Workflow –Management – benefits and limitations – WebtechnologiesforApplicationIntegration.

Unit-II : Web Services Building Block — 9

Web Services – Definition – WebServices and EAI – Web Services Technologies – XML basics - web servicesArchitecture – SOAP – WSDL – UDDI –WS – Addressing – WS – Routing –Webserviceimplementation– Javabasedwebservices-.NETbasedwebservices.

Unit-III : Web Service Security — 9

XML signature – XML Encryption – SAML -XKMS–WS-Security–WSPolicy–Webservicesecurity framework.NETand passport – UDDI and security - web service security in java – mobile webservice security.

Unit-IV : Semantic Web Services — 9

Semantic web service – architecture – RDFDatamodel–RDFschema–OWL–ontology–roleof ontologyinwebservices-semantic Webserviceimplementationissues

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Unit-V : ServiceComposition		9
ServiceCoordinationandCompositioncoordination protocols–WS–Coordination –WS–transaction –WSCI–Service Composition – Service Composition Models – Dependencies betweencoordinationandcomposition–BPEL–Currenttrends		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Uttam K. Roy	Web Technologies	Oxford University Press	2010
2.	G. Radhamani	Web Services Security and E-business	IGI Global	2007

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Martin kalin	Java Web Services	O'Reilly Media, Inc	2013
2.	Shreeraj Shah	Hacking Web Services	Charles River Media	2006
3.	James Snell, Doug Tidwell, PavelKulchenko	Programming Web Services with SOAP	O'Reilly Media	2001

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Course Code & Course Name	:	19CYC26 -WEB SERVICES LAB	L	T	P	C
			0	0	2	1

Course Objectives

1.	To Understandtheapplicationnumbertheoryinsecurity.
2.	To Studythesymmetrickeyand publickeyalgorithms
3.	To Understandthecompressiontechniquesforsecurity
4.	To learn security concepts in web service
5.	To understand registry methods in web services

Course Outcomes

1.	Abletoimplementpro gramusingmodulesarithmetic forsecurity
2.	Toimplementsymmetrickeyandpublickeyalgorithm
3.	Abilitytoimplementalgorithmsfordigitalsignatureandhashing
4.	Develop the security in web services
5.	Design the udi registry by using web services

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC26.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC26.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC26.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC26.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC26.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	CreateanXML fileforanydomainwithmultiplesublevelcomplexity.(Example:Studentsdata,Employeeinformation,Product detailsetc..)
2.	CreateaDTDandXMLschemafortheXML file.
3.	TabulatethexmlcontentusingXSL.
4.	ValidateaXMLfileusingjavascriptwithXMLDOM
5.	WriteajavaprogramtoparseanXML fileusingDOM.
6.	WriteajavaprogramtoparseanXML fileusingSAX.
7.	WriteaprogramtoimplementXML–RPC.
8.	Writeaprogramtoimplementawebserviceusingjavaand.NET.
9.	Write a program to implement WSDL Service (HelloService.WSDL File)
10.	Write a program to implement business UDDI Registry entry

Total : 30

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Course Code & Course Name	:	19CYC27 – CYBER PHYSICAL SYSTEMS	L	T	P	C
			3	0	0	3

Course Objectives

1.	To understand the basic concepts of Cypher physical system
2.	To understand the principles of automated control design
3.	To understand the CPS implementation
4.	To explain different formal methods for safety assurance of CPS
5.	To understand the secure deployment of CPS

Course Outcomes

1.	Understand the concepts of Cypher physical system in real world application
2.	Design his own model for cyber physical system
3.	Understand various modeling formalisms for CPS, such as hybrid automata, state-space methods, etc
4.	Understand the basics of CPS implementation
5.	Understand CPS security and safety aspects

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC27.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC27.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC27.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC27.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC27.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : INTRODUCTION TO CYBER PHYSICAL SYSTEMS (CPS) — 9

Cyber-Physical Systems (CPS) in the real world - Basic principles of design and validation of CPS - Industry 4.0, AutoSAR, IIOT implications - Building Automation, Medical CPS -- CPS - Platform components - CPS HW platforms - Processors, Sensors, Actuators - CPS Network – Wireless Hart, CAN, Automotive Ethernet - CPS Sw stack - RTOS - Scheduling Real Time control tasks

Unit-II : PRINCIPLES OF AUTOMATED CONTROL DESIGN — 9

Principles of Automated Control Design - Dynamical Systems and Stability - Controller Design Techniques - Stability Analysis: CLFs, MLFs, stability under slow switching - Performance under Packet drop and Noise.

Unit-III : CPS IMPLEMENTATION — 9

CPS implementation - From features to software components, Mapping software components to ECUs - CPS Performance Analysis - effect of scheduling, bus latency, sense and actuation faults on control performance, network congestion.

Unit-IV :FORMAL METHODS FOR SAFETY ASSURANCE OF CPS — 9

Formal Methods for Safety Assurance of Cyber-Physical Systems - Advanced Automata based modeling and analysis - Basic introduction and examples - Timed and Hybrid Automata - Definition of trajectories, zenoness - Formal Analysis: Flowpipe construction, reachability analysis - Analysis of CPS Software: - Weakest Pre-conditions - Bounded Model checking.

Unit-V : SECURE DEPLOYMENT OF CPS — 9

Secure Deployment of CPS - Attack models - Secure Task mapping and Partitioning - State estimation for attack detection - Automotive Case study : Vehicle ABS hacking - Power Distribution Case study : Attacks on SmartGrids.

Total : 45

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Text Books :

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Rajeev Alur	Principles of Cyber-Physical Systems	MIT Press	2018
2.	E. A. Lee, Sanjit Seshia	Introduction to Embedded Systems – A Cyber–Physical Systems Approach	MIT Press	2017
3.	Platzer, Andre	Logical Foundations of Cyber-Physical Systems	Springer	2018

Referrence Books :

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Möller, Dietmar P.F	Computing Fundamentals in Cyber-Physical Systems Concepts, Design Methods, and Applications	Springer	2016

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Course Code & Course Name	:	19CYC28 - RISK MANAGEMENT	L	T	P	C
			3	0	0	3

Course Objectives

6.	To understand the ways in which risks are quantified and managed by financial institutions
7.	To study how to model the risk of portfolios emanating from fluctuations in marketprices, or market risk
8.	To learn an introduction to commonly used models of credit risk.
9.	To understand balance between a practical approach to the most popular credit risk models and their theoretical underpinnings
10.	To learn credit risk, in particular credit derivatives are discussed.

Course Outcomes

6.	Explain the choice of parameters for VaR, and the impact of autocorrelation on VaR estimates.
7.	Analyze percentage changes in all market variables over the next day are a random sample from the last N days.
8.	Apply various measure volatility using trading days rather than calendar days.
9.	Develop the model-building approach, which is the main alternative to historical simulation
10.	Design the model building approach can be used for the situation

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC28.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC28.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC28.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC28.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC28.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : RISK AND ITS MANAGEMENT — 9

This study unit introduces risk, its fundamental importance to a company and the sorts of risk that investors expect companies to take. A risk management framework is introduced against a backdrop of corporate finance principles, providing an umbrella methodology for the management of risk and highlighting where different treatment is needed according to the nature of a particular risk.

Unit-II : FINANCIAL MARKET RISK: INTEREST RATES — 9

No company can escape interest rate risk and this study unit focuses on how interest rate sensitivity and its impact varies according to the type of company and business environment. The study unit provides appropriate responses to each different set of circumstances, introducing the science of the yield curve and the many instruments available for managing interest rate risk, explaining when each might be used.

Unit-III : FINANCIAL MARKET RISK: FOREIGN EXCHANGE — 9

This study unit explains the different types of foreign exchange risk that can affect a company and how each might be evaluated and responded to. It recognizes that foreign exchange risk may be fundamental to the company and that an appropriate response needs to be drawn up for each type of risk in the context of a company's broader business and shareholder objectives. It introduces instruments available for managing risk, together with techniques for their use, giving extensive choice to business managers on how to respond to foreign exchange risk.

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Unit-IV : FINANCIAL RISK: LIQUIDITY	9
All companies have liquidity risk (the risk of the inability to make required payments company wide as they fall due) and this risk arises from many different sources. The principles for managing liquidity risk are perhaps the most difficult to generalise (as companies' funding arrangements are very individual) but this unit takes an approach similar to that for other risks and provides a structured approach to the management of this particularly difficult but crucial risk	
Unit-V : OTHER FINANCIAL RISKS AND ISSUES	**9**
This study unit considers some other risk-related areas commonly managed by finance professionals. In the first section we consider the risk in the counterparties with whom companies deal, ranging from customers and suppliers to banks; the risks arising from changes in commodity prices (which have similarities and links to foreign exchange risk); and risks arising from obligations to meet pension payments in defined benefit pension schemes. The study unit concludes by looking at two final issues; the control of operational risk within treasury departments and external risk reporting requirements.	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
2.	Thomas S. Coleman	Quantitative Risk Management	Harrison Bauer	2012
3.	Alexander Solla	Financial Risk Management	Harrison Bauer	2015

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dan Galai, Michel Crouhy, and Robert Mark	The Essentials of Risk Management	Financial Crisis	2002
2.	Andrew J.Dubrin	Essential of Management	Thomson Southwestern	2012
3.	Margaret Woods and Kevin Dowd	Financial RiskManagementforManagement Accountants	Society of Management Accountants of Canada	2008

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Course Code & Course Name	:	19CYC29 -INTRUSION DETECTION AND PREVENTION SYSTEM	L	T	P	C
			3	0	0	3

Course Objectives

1.	To learn the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion DetectionSystems
2.	Analyze intrusion detection alerts and logs to distinguishattack types from falsealarms
3.	To study the installation process of snort
4.	To understand the working principles of snort
5.	To learn how to intrusion detection by using ACID

Course Outcomes

1.	Explain the fundamental concepts of Network Protocol Analysis
2.	Use various protocol analyzers and Network Intrusion Detection Systems as security tools to detect network attacks
3.	Implement the Snort in Real time world
4.	Analyze the Snort working principles
5.	Develop Agent for intrusion detection by using ACID

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC29.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC29.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC29.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC29.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC29.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : History of Intrusion detection — 9

History of Intrusion detection, Audit, Concept and definition , Internal and external threats to data, attacks, Need and types of IDS, Information sources Host based information sources, Network based information sources.

Unit-II :Intrusion Prevention Systems — 9

Intrusion Prevention Systems, Network IDs protocol based IDs ,Hybrid IDs, Analysis schemes, thinking about intrusion. A model for intrusion analysis , techniques Responses requirement of responses, types of responses mapping responses to policy Vulnerability analysis, credential analysis non credential analysis

Unit-III :Introduction to Snort — 9

Introduction to Snort, Snort Installation Scenarios, Installing Snort, Running Snort on Multiple Network Interfaces, Snort Command Line Options. Step-By-Step Procedure to Compileand Install Snort Location of Snort Files, Snort Modes Snort Alert Modes

Unit-IV :Working with Snort Rules — 9

Working with Snort Rules, Rule Headers, Rule Options, The Snort Configuration File etc. Plugins, Preprocessors and Output Modules, Using Snort with MySQL

Unit-V :Using ACID — 9

Using ACID and Snort Snarf with Snort, Agent development for intrusion detection, Architecture models of IDs andIPs.

Total : 45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	RafeeqRehman	Intrusion Detection with SNORT	1st Edition, Prentice Hall	2003
2.	Philippe Bune	An Introduction to intrusion detectionSystem	SANS Institute	2005

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Christopher Kruegel	Intrusion Detection and Correlation Challenges and Solutions	1st Edition Springer	2005
2.	Carl Endorf	Eugene Schultz and Jim Mellander	1st Edition, Tata McGraw-Hill	2004
3.	Rebecca Bace, Peter Mell	Intrusion detection System	NIST	2008

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Course Code & Course Name	:	19CYC30 -CYBER LAWS AND ETHICS	L	T	P	C
			3	0	0	3

Course Objectives

1.	**To study evaluation of cyber law**
2.	To learn concepts of Information Technology Act
3.	To understand the cyber law and how to find threats, attacks and how to prevent from attacks
4.	To study the electornic business and concepts of ethics
5.	To learn cyber ethics concepts

Course Outcomes

1.	understand the importance of professional practice
2.	Analyse the rights and responsibilities as an employee
3.	Implement the cyber law in related fields
4.	Explain the legal issues in e commerse
5.	Apply the cyber ethics in real time world

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC30.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC30.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC30.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC30.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC30.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :Introduction to Cyber Law — 9

Evolution of computer technology, emergence of cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.

Unit-II :Information Technology Act — 9

Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.

Unit-III :Cyber Law and Related Legislation — 9

Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR).

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Unit-IV :Electronic Business and Legal Issues			9
Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.			
Unit-V :Cyber Ethics			**9**
The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics. Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles, Introduction to Block chain Ethics.			
	Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	HarrishChander	Cyber Laws and IT Protection	PHI learning	2019
2.	Markus Christen, Michele Loi	The Ethics of Cybersecurity	PHI learning	2020

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Debby Russell	Computer Security Basics	2nd Edition, O Reilly Media	2006
2.	Thomas R. Peltier	Information Security policies and procedures	A Practitioners Reference, 2nd Edition Prentice Hall	2004
3.	Kenneth J. Knapp	Security and Global Information Assurance	Threat Analysis and Response Solutions, IGI Global	2009

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Course Code & Course Name	:	19CYC31 -SOFTWARE ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives

1.	Understand the phases in a softwareproject
2.	Understand fundamental concepts of requirements engineering and AnalysisModelling.
3.	Understand the major considerations for enterprise integration anddeployment.
4.	Learn various testing and maintenancemeasures
5.	Apply different techniques to measure software performance

Course Outcomes

1.	Identify the key activities in managing a softwareproject.
2.	Compare different processmodels.
3.	Concepts of requirements engineering and Analysis Modeling.
4.	Apply systematic procedure for software design anddeployment.
5.	Compare and contrast the various testing and maintenance

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC31.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC31.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC31.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC31.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC31.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Software Process AndProjectManagement — 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Software Project Management: Estimation – LOC and FP Based Estimation, COCOMO Model – Project Scheduling – Scheduling, Earned Value Analysis - RiskManagement.

Unit-II :Requirements AnalysisAndSpecification — 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

Unit-III :Software Design — 9

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

Unit-IV :TestingAnd Implementation — 9

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring.

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Unit-V :ProjectManagement			9
Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO II - Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA - Process and Project Metrics.			
	Total	:	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Roger S. Pressman	Software Engineering – A Practitioner"s Approach	McGraw-Hill International Edition	2010
2.	Stephen R. Schach	Object-Oriented andClassical Software Engineering – Irwin Computer Science	McGraw-Hill Education	2010

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ian Sommerville	Software Engineering	Pearson Education Asia	2011
2.	Rajib Mall	Fundamentals of Software Engineering	PHI Learning Private Limited,	2009
3.	PankajJalote	Software Engineering- A Precise Approach	Wiley India	2010

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Course Code & Course Name	:	19CYC32 -OBJECT ORIENTED PROGRAMMING	L	T	P	C
			3	0	0	3

Course Objectives

1.	Understand the basic Object OrientedProgramming concepts.
2.	Developsolutionstoproblemsby usingofDataAbstraction,EncapsulationandInheritance.
3.	Abilitytoimplementone or morepatternsinvolvingrealizationofanabstractinterface.
4.	Utilizationofpolymorphisminthesolutionofproblemswhichcantakeadvantageofdynamic dispatching.
5.	Tocomprehendtheartofprogramming,thestructureandthemeaningofbasicJavaprograms.

Course Outcomes

1.	Classifybasicconceptsandstructureofobject-orientedprogramming.
2.	Implement real time applications by using constructor, operator overloading and function over loading in C++ Programming language.
3.	DemonstrateofInheritanceandpolymorphismtechniquesin C++Programminglanguage.
4.	AbletowritesimpleprogramsinJAVAProgramminglanguage.
5.	Implement real time application by using exception handling and multithreaded techniques inJAVA programminglanguage

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC32.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC32.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC32.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC32.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC32.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : Basic Concepts Of Oop — 9

Introduction OOP: Principles of OOP, Benefits and applications of OOP - Overview of C++: Program Structure-Namespace- Identifiers-Declaration of variables-Constants-Operators- Reference Variables - Functions in C++: Inline Functions-Friend Functions - Objects and classes: Basics of object and class in C++-Private and Public Members-Static Data and Function Members-Class Scope and Accessing Class Members

Unit-II :ConstructorsAndOverloading — 9

Constructors: Types of Constructors-Destructors - Overloading: Operator Overloading: Overloading Unary and Binary Operators-Rules for Overloading Operators - Function Overloading

Unit-III :InheritanceAndPolymorphism — 9

Base Class and Derived Class-Types of Inheritance: Single-Multiple-Multilevel-Hierarchical-Protected Members. DerivedClassConstructors–Overriding,MemberFunctions-VirtualBaseClass-AbstractClass-Polymorphism:this pointer - VirtualFunctions.

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Unit-IV :IntroductionToJava			9
Basic Java Concepts: Objects – Classes – Methods and Messages –Abstraction and Encapsulation – Inheritance – Abstract Classes – Polymorphism - Access specifiers – Static Members –Constructors – Finalize Method			
Unit-V :JavaProgramming			**9**
Arrays – Strings - Packages and Interfaces - Exception Handling – Multithreaded Programming- Dynamic Binding – Final Keyword – Abstract classes.			
	Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	E Balagurusamy	Object Oriented Programming with C++	Tata McGraw Hill	2012
2.	Herbert Schlitz	JAVA -The Compete Reference	Tata McGraw-Hill	2014

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	BjarneStroustrup	The C++ Programming Language	Pearson Education	2012
2.	Deitel and Deitel	C++ : How to Program	PHI	2014
3.	Herbert Schlitz	The Compete Reference C++	Tata McGraw Hill Wesley	2014
4.	Cay S. Horstmann and Gary Cornell	Core Java: Volume I – Fundamentals	Sun Microsystems Press	2008
5.	C. Thomas Wu	An introduction to Object- oriented programming with Java	Tata McGraw-Hill Publishing company Ltd	2006

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Course Code & Course Name	:	19CYC33 – OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	Understand the basic Object OrientedProgramming concepts.
2.	Developsolutionstoproblemsby usingofDataAbstraction,EncapsulationandInheritance.
3.	Abilitytoimplementone or morepatternsinvolvingrealizationofanabstractinterface.
4.	Utilizationofpolymorphismto solve problemswhichcantakeadvantageofdynamic dispatching.
5.	Tocomprehendtheartofprogramming,thestructureandthemeaningofbasicJavaprograms.

Course Outcomes

1.	Classifybasicconceptsandstructureofobject-orientedprogramming.
2.	Implementrealtimeapplicationsbyusingconstructor,operatoroverloadingandfunctionoverloading
3.	DemonstrateInheritanceandpolymorphismtechniquesin C++Programminglanguage.
4.	AbletowritesimpleprogramsinJAVAProgramminglanguage.
5.	Implement real time application by using exception handling and multithreaded techniques inJAVA programminglanguage.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC33.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC33.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC33.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC33.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC33.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	Passbyvalue,Passbyreference and Passbyaddress.
2.	Constructors & Destructors, CopyConstructor.
3.	Friend Function & FriendClass.
4.	Inheritance.
5.	Polymorphism & Function Overloading.
6.	VirtualFunctions.
7.	Overload Unary & Binary Operators Both as Member Function & Non MemberFunction.
8.	Class Templates & FunctionTemplates.
9.	Exception HandlingMechanism.
10.	Standard Template Libraryconcept.

Total : 45

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Course Code & Course Name	:	19CYC34 -DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
			3	0	0	3

Course Objectives

1.	Tolearnhowto developefficientalgorithms forsimplecomputationaltasks.
2.	Tolearnreasoningandcorrectnessofalgorithms.
3.	Tolearnthecomplexitymeasures,differentrangeofbehaviorsofalgorithmsandthenotionoftractableand intractable problems will beunderstood.
4.	To design the algorithms for realtime problems.
5.	Tosolvethe problemsbyusingdifferenttypesofalgorithmstechniques.

Course Outcomes

1.	Design algorithms for various computingproblems.
2.	Analyzethetimeandspacecomplexityofalgorithms.
3.	Criticallyanalyzethe differentalgorithmdesigntechniquesfora givenproblem.
4.	Modifyexistingalgorithmstoimproveefficiency
5.	Solvetherealtimeproblemsbyusingbacktrackingandbranchand boundtechniques.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC34.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC34.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC34.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC34.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC34.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : Introduction — 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms.

Unit-II :Brute ForceAndDivide-And-Conquer — 9

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem. Divide and conquer methodology–Mergesort– Quick sort – Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication-Closest-Pair and Convex-Hull Problems.

Unit-III :Dynamic ProgrammingandGreedyTechnique — 9

Computing a Binomial Coefficient – Warshall's and Floyd' algorithm – Optimal Binary Search Trees –Knapsack Problem and Memory functions. Greedy Technique– Prim's algorithm- Kruskal's Algorithm-Dijkstra's Algorithm- Huffman Trees.

Unit-IV :IterativeImprovementAndLimitationOfAlgorithm — 9

The Simplex Method-The Maximum-Flow Problem – Maximm Matching in Bipartite Graphs- the Stable marriage Problem. Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NP Complete Problems.

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Unit-V :Backtracking, Branch And Bound And Approximation Algorithm		9
Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem- Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	AnanyLevitin	Introduction to the Design and Analysis of Algorithms	Third Edition, PearsonEducation,.	2012
2.	BogdanCiu botaru& Gabriel-MiroMunte an	Advanced Network Programming Principles & Techniques, NetworkApplication Programming with Java	Springer Verlag	2013

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman	Data Structures And Algorithms	Pearson Education, Reprint	2006
2.	Donald E. Knuth,	The Art of Computer Programming	Volumes 1& 3 Pearson Education,	2009
3.	A I. Chandra Mohan	Design and Analysis of Algorithms	PHI Learning Pvt. Ltd, 2nd Edition	2012
4.	Steven S. Skiena	The Algorithm Design Manual	Second Edition ,Springer	2008
5.	ManasRanjan Kabat	Design And Analysis Of Algorithms	PHI Learning Pvt. Ltd, 2nd Edition	2013

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Course Code & Course Name	:	19CYC35 - DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	To write programs in java to solve problems using divide and conquer strategy.
2.	To write programs in java to solve problems using backtracking strategy.
3.	To write programs in java to solve problems using greedy
4.	To write programs in java to solve problems using dynamic programming techniques strategy.
5.	To write programs in java to solve problems using approximation algorithm design.

Course Outcomes

1.	Ability to write programs in java to solve problems using Divide and Conquer algorithm design techniques..
2.	Write program in java to solve problems using Greedy algorithm design technique
3.	Write program in java to solve problems using Dynamic programming algorithm design technique
4.	Write program in java to solve problems using Backtracking algorithm design technique
5.	Write program in java to solve problems using approximation algorithm design technique

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC35.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC35.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC35.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC35.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC35.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	Write a java program to implement Quick sort algorithm for sorting a list of integers in ascending order
2.	Write a java program to implement Merge sort algorithm for sorting a list of integers in ascending order
3.	Write a java program to implement the backtracking algorithm for the sum of subsets problem.
4.	Write a java program to implement the backtracking algorithm for the Hamiltonian Circuits problem.
5.	Write a java program to implement greedy algorithm for job sequencing with deadlines.
6.	Write a java program to implement Dijkstra's algorithm for the Single source shortest path problem.
7.	Write a java program that implements Prim's algorithm to generate minimum cost spanning tree.
8.	Write a java program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
9.	Write a java program to implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.

Total : 45

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Course Code & Course Name	:	19CYC36 -BLOCKCHAIN TECHNOLOGY	L	T	P	C
			3	0	0	3

Course Objectives

1.	To study Basic cryptographic primitives and Blockchain Technology.
2.	To study about Distributed computing basics and the issues related to it.
3.	To know about Bitcoin and ethereum crypto- currencies.
4.	Tolearn about Hyperledger and other advancement in Block chain.
5.	To learn about privacy and security issues in Block chain.

Course Outcomes

1.	Explore Blockchain Technology and cryptographic primitives.
2.	Tell about Distributed Computing and various Cryptographic Techniques.
3.	Solve Bitcoin and Ethereum puzzles to include blocks into Block chain.
4.	Tell about Hyper ledger and its uses.
5.	Address the privacy and security issues In Blockchain Technology.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC36.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC36.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC36.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC36.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC36.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :Introduction — 9

Introduction- Distributed systems- Architecture- Need for Distributed Record Keeping- Modeling faults and adversaries- Byzantine Generals problem-Consensus algorithms and their scalability problems- Cryptcurrency- Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing and digital cash.

Unit-II :Distributed Computing And Cryptography Basics — 9

Introduction- Distributed Computing- issues in Distributed Computing- Atomic Broadcast, Consensus, Byzantine Models of fault tolerance- Hash functions, Puzzle friendly Hash, Collision resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge system.

Unit-III :Bitcoin And Ethereum — 9

Bitcoin- blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use- Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges.

Unit-IV :Hyperledger — 9

Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts- Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain

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Unit-V :Privacy And Security Issues In Blockchain			9
Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – such as Sybil attacks, selfish mining, 51% attacks - -advent of algorand, and Sharding based consensus algorithms to prevent these.			
	Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S.Shukla, M. Dhawan, S.Sharma, S. Venkatesan	Blockchain Technology: Cryptocurrency and Applications	Oxford University Press	2019
2.	Josh Thompson	Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming	Create Space Independent Publishing Platform	2017

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Tiana Laurence	Block chain For Dummies	Wiley	2019
2.	Don Tapscott	Blockchain Revolution: How the Technology BehindBitcoin and Other Cryptocurrencies is Changing the World	Penguin	2018
3.	Daniel Drescher	Blockchain Basics: A Non-Technical Introduction in 25 Steps	Apress	2017

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Course Code & Course Name	:	19CYC37 -MOBILE COMMUNICATION	L	T	P	C
			3	0	0	3

Course Objectives

1.	Understand the fundamentals of mobile communication
2.	Apply the typical mobile networking infrastructure through a popular GSM protocol
3.	Summarize the basics of mobile telecommunication system.
4.	Identify the Mobile Network Layer Functionalities of Mobile communication.
5.	Define the functions of Transport and Application layers

Course Outcomes

1.	State the basics of mobile telecommunication system
2.	Illustrate the generations of telecommunication systems in wireless network
3.	Understand the architectures, the challenges and the Solutions of Wireless Communication
4.	Identify solution for each functionality at each layer
5.	Analyze the functionality of Transport and Application layer

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC37.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC37.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC37.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC37.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC37.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Wireless Communication Fundamentals	9
Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.	
Unit-II :Telecommunication Networks	9
Telecommunication systems – GSM – GPRS – DECT – Satellite Networks - Basics – Parameters and Configurations – Capacity Allocation – FAMA and DAMA – Broadcast Systems – DAB - DVB.	
Unit-III : Wirless Lan	9
Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a - HIPERLAN – Blue Tooth.	
Unit-IV :Mobile Network Layer	9
Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV DSR Alternative Metrics.	
Unit-V :Transport And Application Layers	9
Traditional TCP – Classical TCP improvements – WAP- Introduction to 4G mobile networks- Case study – Mobile multimedia networks.	
Total :	45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jochen Schiller	Mobile Communications	PHI/Pearson Education.Second Edition	2003
2.	William Stallings	Wireless Communications and Networks	PHI/Pearson Education	2002

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	KavehPahlavan, PrasanthKrishnamoorthy	Principles of Wireless Networks	PHI/Pearson Education	2003
2.	UweHansmann, LotharMerk, Martin S, Nicklons and Thomas Stober	Principles of Mobile Computing	Springer,New York	2003
3.	HazysztofWesolowshi	Mobile Communication Systems	John Wiley and Sons Ltd	2002

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Course Code & Course Name	:	19CYC38 -INTERNET OF THINGS	L	T	P	C
			3	0	0	3

Course Objectives

1.	To understand Smart Objects and IoT Architectures
2.	To learn about various IOT-related protocols
3.	To be exposed to web, cloud in the context of IoT
4.	To develop different models for network dynamics
5.	To analyze applications of IoT in realtime scenario

Course Outcomes

1.	Explain the underlying architectures and models in IoT.
2.	Analyze various protocols for IoT at the different layers for IoT
3.	Apply the web of things and cloud of things Models
4.	Develop different models for network dynamics
5.	Study the needs and suggest appropriate solutions for Industrial applications

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC38.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC38.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC38.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC38.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC38.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Introduction — 9

Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security.

Unit-II :IotPROTOCOLS — 9

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security

Unit-III :Web Of Things — 9

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing–Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture

Unit-IV : Iot Business Models — 9

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects – Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon

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Unit-V : Applications		9
The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Hanes,GonzaloSalgueiro,Patrick,Grossetete, Rob Barton and Jerome Henry	Fundamentals:Networking Technologies, Protocols and Use Cases for Internet of Things	Cisco Press	2017
2.	ArshdeepBahga,VijayMadisetti	Internet of Things	A hands-on approach, Universities press	2015

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Easley and Jon Kleinberg	Networks, Crowds, and Markets: Reasoning About a Highly Connected World	Cambridge University Press	2010
2.	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of Things	A John Wiley & Sons, Ltd	2012
3.	Honbo Zhou	The Internet of Things in the Cloud: A Middleware Perspective	CRC Press	2012
4.	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds)	Architecting the Internet of Things	Springer	2011
5.	Olivier Hersent, Omar Elloumi and David Boswarthick	The Internet of Things: Applications to the Smart Grid and Building Automation	Wiley	2012

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Course Code & Course Name	:	19CYC39 -INTERNET OF THINGS LABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	To study the assembly language using simulator and kit.
2.	To perform ALU operations.
3.	To generate waveforms and test timers.
4.	To develop applications using Embedded C.
5.	To develop IoT applications using Aurdino, Raspberry Pi, and Bluemix.

Course Outcomes

1.	Execute Assembly Language experiments using simulator.
2.	Implement ALU operations.
3.	Design waveforms and test timers
4.	Develop real time applications and explore ARM/PIC using Embedded C.
5.	Demonstrate real time applications using Aurdino, Raspberry Pi, and Bluemix.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC39.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC39.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC39.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC39.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC39.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	Write 8051 Assembly Language experiments using simulator.
2.	Test data transfer between registers and memory.
3.	Perform ALU operations.
4.	Using interrupts generate waveforms and test Timers.
5.	Write assembly language experiments using Kit to test interfaces and interrupts using Traffic Generator, DAC, ADC,
6.	Stepper Motor (2).
7.	Write Basic and arithmetic Programs Using Embedded C.
8.	Write Embedded C program to test interrupt and timers.

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9.	Develop Real time applications – clock generation, wave form generation, counter using embedded C.		
10.	Explore ARM/PIC based controllers using Embedded C.		
11.	Explore different communication methods with IoT devices		
12.	Develop simple application – testing infrared sensor – IoT Applications – using Aurdino.		
13.	Develop simple application – testing temperature, light sensor – IOT Application using open platform/Raspberry Pi.		
14.	Deploy IOT applications using platforms such as Bluemix.		
15.	Develop Real time applications – clock generation, wave form generation, counter using embedded C.		
16.	Explore ARM/PIC based controllers using Embedded C.		
	Total	**:**	**45**

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Course Code & Course Name	:	19CYC40-ARTIFICIAL INTELLIGENCE	L	T	P	C
			3	0	0	3

Course Objectives

1.	Tolearntheconceptsofcomputationalintelligenceforsolvingproblems
2.	To Understand about knowledge representation and decisionsmaking
3.	Tointroducethe conceptsofmachinelearningand NeuralNetworks
4.	To Initiate the Perception of GeneticAlgorithms.
5.	To understand the knowledge about ExpertSystems

Course Outcomes

1.	Apply different searching strategies forproblem solving
2.	Representplanningproblemsandfindthesequenceofactionstoachievegoalsbyusingknowledge representation.
3.	Comprehends the various machine learning techniques.
4.	Demonstrate different techniquesto represent Genetic Algorithms
5.	Develop the expert system for the real timeproblems.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYC40.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC40.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC40.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC40.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC40.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Introduction To Al AndProductionSystems — 9

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of searchalgorithms

Unit-II :RepresentationOfKnowledge — 9

Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic- Structured representation ofknowledge.

Unit-III :MachineLearning — 9

Machine Learning-Supervised learning-un Supervised learning-Reinforcement Learning-Learning by Inductive Logic Programming-Computational Learning Theory-Neural Nets-Artificial Neural Nets-Topology of AI- Learning using Neural Nets-Back Propagation Training Algorithm- Multi-Layered ADALINE Models- Hopfield Neural Net-Associative Memory-Fuzzy Neural Nets- Self Organizing Neural Net-Adaptive Resonance Theory.

Unit-IV :GeneticAlgorithms — 9

Genetic Algorithms-Hollands Observation-Fundamental Theorem of Genetic Algorithms-Markov Model for Convergence Analysis-Applications of Optimization problem,Intelligent Systems-Genetic Programming- Fuzzy Neural Nets-Cognitive Maps-Stability Analysis-Control Command by Cognitive Map-Visual perception- CaseStudy

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Unit-V :ExpertSystems			9
Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.			
	Total	:	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Elaine Rich, Kevin Knight, Shivashankar.B.Nair	Artificial Intelligence	Tata McGraw Hill	2011
2.	AmitKonar	Artificial Intelligence	CRC,Press	2009

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Russell, Peter Norvig	ArtificialIntelligence–A ModernApproach	Prentice Hall of India	2009
2.	Dan W. Patterson	Introduction to AI and ES	Pearson Education	2007
3.	AndriesP.Engelbrecht,	Computational Intelligence: An Introduction	John Wiley & Sons	2007
4.	Eugene Charniak, Drew McDermott	Introduction to Artificial Intelligence	Pearson Education	2006.
5.	Nils.J.Nilsson	Artificial Intelligence: A new synthesis	Elsevier	2003

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Course Code & Course Name	:	19CYC41 - PRINCIPLES OF COMPILER DESIGN	L	T	P	C
			3	0	0	3

Course Objectives

1.	To learn the basic concepts of Automatatheory.
2.	To know the basic concepts of compilers.
3.	To learn the functions of Lexical Analyzer and SyntaxAnalyzer.
4.	TounderstandtheprocessofIntermediateCodeGeneration.
5.	Tounderstandthe conceptsofCodeGenerationandCodeOptimization

Course Outcomes

1.	Design a lexical analyzer forcompiler.
2.	Implement a parser such as a bottom– up SLR parser without usingYACC.
3.	Implement semantic rules into aparser.
4.	Implement intermediate code generator for compilerdesign.
5.	Implement code generator and codeoptimizer.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC41.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC41.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC41.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC41.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC41.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :Introduction ToAutomata AndCompiler

Basic Machines Finite Automata (FA) - Deterministic Finite Automata (DFA) – Nondeterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions-Finite State Automata and Regular Expressions. Compilers – Phases of a compiler – Cousins of the Compiler– Compiler construction tools – Lexical Analysis – Role of LexiAnalyzer– Input Buffering – Tokens Specification.

Unit-II :LexicalAnalysis

Recognition machine - A typical lexical analyzer generator - Parsing - Top Down parsing – Recursive Descent Parsing – Predictive Parsing. Syntax

Unit-III :Analysis

Analysis: Role of the parser – Context-Free Grammars — Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.

Unit-IV :Intermediate code Generation

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls. Code Optimization and Code generation:

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Unit-V :CodeOptimization			9
Introduction to code optimization - Principal Sources of Optimization – Optimization of basic Blocks – DAG representation of Basic Blocks – Peephole Optimization - code generation- Issues in design of code generator – The target machine - A simple Code generator.			
	Total	:	45

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alfred Aho Jeffrey D Ullman	Compilers Principles Techniques and Tools	Pearson Education	2014
2.	J.E.Hopcroft, R.Motwani and J.D Ullman	Introduction to Automata Theory, Languages and Computations	Pearson Education	2003

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Fischer C N LeBlanc R J	Crafting a compiler with C	Benjamin Cummings	2003
2.	Bennet J P	Introduction to Compiler Techniques	Tata McGraw Hill	2003
3.	Kenneth C Louden	Compiler Construction Principles and Practice	Thompson Learning	2003
4.	Henk Alblas and Albert Nymeyer	Practice and Principles of Compiler Building wit h C	PH.	2001
5.	Alfred V. Ahoet. Al	Compilers Principles, Techniques and Tools	Pearson Education	2007

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Course Code & Course Name	:	19CYC42 - COMPILER DESIGN LABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	To learn the basic concepts of Automatatheory.
2.	To know the basic concepts of compilers.
3.	To learn the functions of Lexical Analyzer and SyntaxAnalyzer.
4.	TounderstandtheprocessofIntermediateCodeGeneration.
5.	Tounderstandthe conceptsofCodeGenerationandCodeOptimization

Course Outcomes

1.	Ability to design and implement lexical analyzer using C and LEX tool.
2.	Ability to design and implement parsers using C, YACC and LEX tools.
3.	Ability to design and implement compilers.
4.	Implement intermediate code generator for compilerdesign.
5.	Implement code generator and codeoptimizer.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
19CYC42.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC42.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC42.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC42.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYC42.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	Implementation of lexical analyzer inC.
2.	Implementation of lexical analyzer using LEXtool.
3.	Implementation ofthe recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and*.
4.	Implementation of a parser for the same grammar as given in problem using YACC andLEX.
5.	WritesemanticrulestotheYACCprograminproblemandimplementacalculatorthattakesanexpression with digits, + and * and computes and prints itsvalue.
6.	Implementation of the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignmentstatement.
7.	Implementation of back end of a compiler usingC.
8.	Stack implementation of LR parser usingC.
9.	Implementation of lexical analyzer inC.

Total	:	45

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Course Code & Course Name	:	19CYC43 - DATA WAREHOUSING AND DATA MINING	L	T	P	C
			3	0	0	3

Course Objectives

1.	Tostudythe conceptsofdatawarehousingarchitecture
2.	To understand data mining principles andtechniques
3.	Tolearntouseassociationruleminingforhandlinglargedata
4.	Tostudyclassificationandclusteringforbetterorganizationandretrievalofdata
5.	To exposebusinessapplicationsandrecenttrendsofDatamining

Course Outcomes

1.	Identify the components of data warehousingarchitecture
2.	Implement data preprocessing for miningapplications
3.	Apply the association rules for miningthe data
4.	Deployappropriateclassificationtechniques
5.	Analyzeclusteringtechniques

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYC43.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC43.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC43.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC43.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYC43.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : DataWarehousing — 9

Introduction to Data warehousing - Data warehousing Components - Building a Data Warehouse - Mapping the Data Warehouse to Multiprocessor Architecture - DBMS Schemas for Decision Support - Data Extraction, Cleanup, and Transformation Tools - Multidimensional Data Model-On Line Analytical Processing and tools - Need for OLAP- OLAP Operations – Types ofOLAP servers.

Unit-II : DataMining — 9

Data Mining-Motivation and Importance of Data mining – Evolution of Database systems – Data mining functionalities – Steps in KDD process- Architecture of a typical data mining system - Classification of data mining systems – Data mining task primitives - Major issues in data mining

Unit-III :Association Rule Mining — 9

Introduction - Association rule mining - Mining frequent item sets with and without candidate generation – Pattern evaluation methods - Mining various kinds of association rules: Pattern mining - Mining multilevel association - Mining multidimensional association - Constraint based mining.

Unit-IV :Classification — 9

Basic concepts - Decision tree induction - Bayesian classification - Rule based classification - Classification by back propagation - Model Evaluation and Selection - Techniques to improve classification – Case study

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Unit-V :Cluster		9
Cluster analysis - Clustering techniques: Partitioning methods - Hierarchical methods - Evaluation of clustering Outlier detection: Outliers and Outlier analysis - Outlier detection methods- Case study		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jiawei Han and Micheline Kamber,	Data Mining: Concepts and Techniques	Morgan Kaufmann Publishers	2011.
2.	Alex Berson and Stephen J. Smith	Data Warehousing, Data Mining & OLAP	Tata McGraw Hill Edition	2011

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	G. K. Gupta	Introduction to Data Mining with Case Studies	Prentice Hall of India	2014
2.	Ian Witten, Eibe Frank	Data Mining: Practical Machine Learning Tools and Techniques	Morgan Kaufmann	2011
3.	Alex Berson and Stephen J. Smith	Data Warehousing, Data Mining & OLAP	Tata McGraw – Hill Edition	2007
4.	K.P. Soman, ShyamDiwakarand V. Ajay	Insight into Data mining Theory and Practice	Prentice Hall of India	2006
5.	George M Marakas	ModernData Warehousing, Miningand Visualization	Prentice Hall	2003

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PROGRAMME ELECTIVE COURSES (PEC)

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Course Code &Course Name	:	19CYE01 & C# AND .NET FRAMEWORK	L	T	P	C
			3	0	0	3

Course Objectives

1.	To discuss the concepts of NET Framework and C#language
2.	ToDesignand developreal-timeapplicationsusingobjectorientedconceptsinC#
3.	ToDesignanddevelopreal-timeapplicationsusing.NET
4.	To Design and develop windows and web based applications usingC#
5.	To Develop C# programs for Multithreading anddatabaseapplications

Course Outcomes

1.	Discuss the concepts of NET Framework and C#language
2.	Design and develop real-time applications using object oriented concepts inC#
3.	Design and develop real-time applications using.NET
4.	Develop the web based applications using ADO.NET inC#
5.	Implementthenetworkapplicationbyusing.Netframework.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE01.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE01.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE01.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE01.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE01.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :INTRODUCTION TO C#	9
Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, and Enumerations.	
Unit-II :OBJECT ORIENTED ASPECTS OF C#	**9**
Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.	
Unit-III :APPLICATION DEVELOPMENT ON .NET	**9**
Windows Applications: Basic windows controls. Advanced controls, multi window applications, Accessing Data with ADO.NET: Connections, Data Adapters, Datasets, Data Application, Working with relational databases, multiple tables in a single dataset, Data views, Data Binding, Complex Binding, Navigating through datasets using bound controls.	
Unit-IV :WEB BASED APPLICATION DEVELOPMENT ON .NET	**9**
Programming Web Applications with Web Forms, web server controls, Programming Web Services.	

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Unit-V :THE CLR AND THE .NET FRAMEWORK			9
Assemblies, Versioning, Attributes, Reflection, Viewing Metadata, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.			
	Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	E. Balagurusamy	Programming in C#	Tata McGraw-Hill	2004
2.	J. Liberty	Programming C#	O'Reilly	2002

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Herbert Schildt	The Complete Reference: C#	Tata McGraw-Hill	2004
2.	Robinson et al	Professional C#	Wrox Press	2002
3.	Andrew Troelsen	C# and the .NET Platform	A1 Press	2003
4.	Thamarai Selvi, R. Murugesan	A Textbook on C#	Pearson Education	2003
5.	Karli Watson, Christian Nagel,Jacob Hammer Pedersen,Jon Reid, Morgan Skinner	Beginning Viual C# 2010	Wiley India Pvt.Ltd	2010

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Course Code &Course Name	:	19CYE02 & SOFTWARE PROJECTMANAGEMENT	L	T	P	C
			3	0	0	3

Course Objectives

1.	To highlight different techniques for software costestimation
2.	To plan and monitor projects for the riskmanagement
3.	To explore the process of monitoringand controlling
4.	To manage people and organizationof teams
5.	To estimate the cost associated withproject

Course Outcomes

1.	Able to practice the process of project management and its application in delivering successfulprojects
2.	Evaluatetherisksandhazardsintheprojectmanagement
3.	Apply cost monitoring and control strategies for softwareprojects
4.	Identifydesirablecharacteristicsofeffectiveprojectmanagersand managetheorganizational behavior of people working inteams
5.	Evaluateaprojecttodevelopthescopeofwork,provideaccuratecostestimatesandtoplanthe variousactivities

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE02.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE02.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE02.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE02.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE02.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :INTRODUCTION AND PROJECT EVALUATION — 9

Project Definition – Importance of Software Project Management – Contract Management – Activities covered by Software Project Management – Setting objectives – Stakeholders - Management Control – Overview of Project Planning – Stepwise Project Planning – Project evaluation - Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques.

Unit-II :ACTIVITY PLANNING AND RISK MANAGEMENT — 9

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Critical path (CRM) method – Activity Float – Shortening the Project Duration– Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis.

Unit-III :PROJECT MANAGEMENT AND CONTROL — 9

Introduction – Creating the Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance.

Unit-IV :MANAGING PEOPLE AND ORGANIZING TEAMS — 9

Introduction – Understanding Behavior – Organizational Behavior – Selecting the Right Person for the Job–Instruction in the Best Methods – Motivation – The Oldham Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety.

Unit-V :SOFTWARE EFFORT ESTIMATION		9
Introduction – The basics for software estimation – Software effort estimation techniques – Expert judgment–Estimating by analogy – Albrecht function point analysis –Function points Mark II – COSMIC Full function points - COCOMO: A Parametric Productivity Model.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bob Hughes, Mike Cotterell	Software Project Management	Tata McGraw Hill, Fifth Edition	2011
2.	Robert K. Wysocki	Effective Software Project Management	Wiley Publication	2011

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Adolfo Villafiorita	Introduction to Software Project Management	CRC Press	2014
2.	Jalote	Software Project Management in Practice	Pearson Education	2010
3.	Murali k. chemuturi, Thomas m cagly	Mastering software project management- best practices tools and Techniques	j ross Publication	2010

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Course Name	:	19CYE03 & SALESFORCE CRM AND PLATFORM	L	T	P	C
			0	0	2	1

Course Objectives

1.	To learn the basics of Salesforce as a CRM and aPlatform
2.	To learn the administrative and configurable capabilities ofSalesforce
3.	To write business logic customizations using Apex triggers and classes customized using SOQL andDML
4.	To describe how trigger code works within the basics of the Save Order of Execution andtransactions
5.	To write Visualforce markup code to customize the userinterface

Course Outcomes

1.	Leverage configurable aspects of Salesforce for business processautomation
2.	Understand Apex Programming and Visualforce
3.	Develop Apex program with SOQL &DML
4.	Testing and Execution of triggers inApex
5.	Salesforce for business processautomation

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE03.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE03.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE03.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE03.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE03.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : INTRODUCTION TO SALESFORCE — 9

Salesforce Overview - Architecture – Environment - Sales Cloud - Service Cloud - Navigating Setup Salesforce Objects - Standard Objects - Custom Objects & Fields - Field Types - Master Detail - Lookup Relationship - Schema Builder - Global Search.Standard UI Configuration - Page Layouts - Record Types - Record Type Based Picklist Values. Process Automation - Validation Rules, Workflow Rules and Actions - Process Builder - Approval Process. Salesforce Security Model - Role Hierarchy - Profiles and Permission Sets - Access Controls - Object and Field Level Security - Record Level Security - Org Wide Defaults - Record Ownership - Sharing Rules.

Unit-II :SALESFORCECRMFUNCTIONALITY — 9

CRM Basics : Introduction to CRM - Sales Objects - Service Objects. Sales Process: Lead - Web-to-Lead - Lead Conversion - Opportunities - Accounts & Contacts – Products. Service Process: Case, Email-to-Case, Web-to-Case. Automation Rules: Lead/Case Assignment Rules - Escalation Rules - Merge Records - DuplicationRules.

Unit-III :APEXPROGRAMMING BASICS — 9

Programming with Apex: Introduction to Apex - Statements & Collections - Introduction to Apex Classes. SOQL: Syntax, SOQL in Apex, Dynamic SOQL. Query using relationships: Relationship name, child-to-parent relationship – parent-to-child relationship.DML essentials: DML operations with Apex - Transaction Controls - DML errors.

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Unit-IV :APEX PROGRAMMINGDEVELOPMENT	9
Apex Trigger Essentials: Introduction - Trigger Events - Syntax - Trigger context variables. Apex Class Implementation: Implement Business Logic in Apex class - Trigger Handlers and Controllers - Best Practices (Bulkification, No DML & queries inside loops) - Apex Test Classes. Advanced Apex: Asynchronous Apex - Apex Scheduler - Batch Apex - Future methods - Queueable Apex API Callouts - Apex Web Services - Standard APIs. Transactions: Lifecycle of a transaction – Memory life cycle for static variable - Salesforce order of Execution - Execution Governor Limits. Development Tools: Developer Console - Debug Logs - Eclipse & Force.com IDE - Visual Studio – Workbench	
Unit-V :VISUALFORCEDEVELOPMENT	**9**
Visualforce: Introduction – Creating Visualforce pages – Important Visualforce Tags - Exploring the View and Controller layers of Visualforce – Standard Controller – Display data from a record in a Visualforce page – Display related data – Invoke standard controller actions– Using standard list controller in a Visualforce page – Using custom controllers and extensions – Security concerns.	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Paul Goodey, - Fourth Edition,	Salesforce CRM - The Definitive Admin Handbook	4th Revised edition Edition, PACKT enterprises, Kindle edition	2016
2.	Matt Kaufmann and Michael Wicherski	Learning Apex Programming	PACKT enterprises, Kindle edition	2015

REFERENCE BOOK

SI.NO	Author(s)	Title of the Book	Publisher	Year of Publications
1.	David Taber	Salesforce.com Secrets of Success: Best Practices for Growth and Profitability	2nd Edition, Prentice Hall	2013
2.	Keir Bowden	Visualforce Development Cookbook	PACKT enterprises, Kindle edition	2016

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Course Code & Course Name	:	19CYE04&Salesforce CRM and Platform Laboratory	L	T	P	C
			0	0	2	1

Course Objectives

1.	To learn the basics of Salesforce as a CRM and aPlatform
2.	To learn the administrative and configurable capabilities ofSalesforce
3.	To write business logic customizations using Apex triggers and classes customized using SOQL andDML
4.	To describe how trigger code works within the basics of the Save Order of Execution andtransactions
5.	To write Visualforce markup code to customize the userinterface

Course Outcomes

1.	Leverage configurable aspects of Salesforce for business processautomation
2.	Understand Apex Programming and Visualforce
3.	Develop Apex program with SOQL &DML
4.	Testing and Execution of triggers inApex

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
19CYE04.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE04.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE04.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE04.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE04.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

List of Experiments

1.	SalesforceBasics
2.	Salesforce PlatformBasics
3.	Platform DevelopmentBasics
4.	Developer Console Basics
5.	Apex Basics for Admin
6.	Object Oriented Programming forAdmin
7.	ApexTriggers
8.	SOQL Database .NetBasics
9.	Visual forceBasics
10.	Build a Conference ManagementApplication
11.	Development an Account GeolocationApplication
12.	Transform SQL Queries to SOQLQueries

Total : 45

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Course Name	:	19CYE05&Biometric Systems & Biometric Image Process	L	T	P	C
			3	0	0	3

Course Objectives

1.	Understand the basics of biometrics compared to traditional securing mechanisms.
2.	Design and develop a biometric security system
3.	Gain knowledge in building blocks of research fields like Pattern Recognition, Image Processing etc.
4.	evaluate the fingerprint biometrics of several modalities from measures
5.	Analyze finger biometric technology

Course Outcomes

1.	Understand the technological uplifts with biometrics
2.	Evaluate security systems with biometrics.
3.	Acquire the fundamental concepts of a digital ***image processing*** system
4.	Demonstrate the features of **fingerprint biometrics**
5.	Apply iris biometric for identification

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE05.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE05.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE05.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE05.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE05.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :Introduction — 9

Biometric fundamentals – Biometric technologies – Biometrics Vs traditional techniques –Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes: verification, identification and biometric matching – Performance measures in biometric systems, FAR,FRR, FTE rate, EER and ATV rate, Applications of Biometric Systems, Security and Privacy Issues. Physiological Biometrics : Leading technologies : Finger-scan – Facial-scan – Iris-scan – Voice-scan–components, working principles, competing technologies, strengths and weaknesses – Other physiological biometrics : Hand-scan, Retina-scan – components, working principles, competing technologies, strengths and weaknesses – Automated fingerprint identification systems.

Unit-II : Behavioral Biometrics — 9

Leading technologies: Signature-scan – Keystroke scan – components, working principles, strengths and weaknesses. **Privacy and Standards in Biometrics**: Assessing the Privacy Risks of Biometrics – Designing Privacy- Sympathetic Biometric Systems – Need for standards – different biometric standards.

Unit-III : Fundamentals of Image Processing — 9

Digital Image representation - Fundamental steps in Image Processing Image Enhancement: The Spatial Domain Methods, The Frequency Domain Methods – Image Segmentation: Pixel Classification by Thresholding, Histogram Techniques, Smoothing and Thresholding- Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection.

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Unit-IV : Fingerprint Biometrics	9
Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges -Fingerprint Image Processing - Minutiae Determination - Fingerprint Matching: Fingerprint Classification, Matching policies.	
Unit-V : Iris Biometrics	**9**
Iris System Architecture, Definitions and Notations - Iris Recognition: Iris location, Doubly Dimensionless Projection, Iris code, Comparison - Coordinate System: Head Tilting Problem, Basic Eye Model, Searching Algorithm, Texture Energy Feature	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
3.	Paul Reid	Biometrics for Network Security	Pearson Education	2004
4.	Rafael C.Gonzalez, Richard E.Woods, Steven L.Eddins	Digital Image Processing	Pearson Education	2009
5.				

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
3.	David D. Zhang	Automated Biometrics: Technologies and Systems	Kluwer Academic Publishers	2000
4.	Anil K Jain, Arun A Ross, Karthik Nandakumar	Introduction to Biometrics	Springer	2011
5.	Samir Nanavati, Michael Thieme, Raj Nanavati	Biometrics – Identity Verification in a Networked World	Wiley-dreamtech India Pvt Ltd	2003

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Course Name	:	19CYE06& AWS Academy Cloud Developing	L	T	P	C
			3	0	0	3

Course Objectives

1. Recallcloudcomputingservicesandmodels.
2. Configure AWSIdentityandAccessManagementforprogrammaticaccess.
3. To Develop containerswith AWS Lambda
4. Access solutionswith Amazon APIGateway.
5. Identifybestpracticeforbuildingsecureapplications and deploying applications.

Course Outcomes

1. Create onAWS.
2. Develop AWSIdentityandAccessManagementforprogrammaticaccess.
3. ImplementContainer with AWS Lambda.
4. Organize solutionswith Amazon APIGateway.
5. Buildsecureapplications and deploying applications.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE06.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE06.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE06.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE06.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE06.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :Introduction to Developing on AWS — 9

Course Prerequisites, objectives and overview, AWS Training Portal, Lab Environment, AWS Free Tier, AWS Educate, Systems Development Lifecycle, Steps to Get Started Developing on AWS, Working with AWS SDKs, Errors and Exceptions, Introduction to AWS X-Ray, Introduction to Amazon CloudWatch and AWS CloudTrail, IAM - Shared Responsibility Model, Overview of IAM, Authentication with IAM, Authorization with IAM.

Unit-II : : Developing Storage Solutions with Amazon S3 — 9

Introduction to Amazon S3, Creating Amazon S3 Buckets, Working with Amazon S3 Objects, Protecting Data and Managing Access to Amazon S3 Resources. Developing NoSQL Solutions with Amazon DynamoDB - Introduction to Amazon DynamoDB, Amazon DynamoDB Key Concepts, Partitions and Data Distribution, Secondary Indexes, Read/Write Throughput, Streams and Global Tables, Backup and Restore, Basic Operations for Amazon DynamoDB Tables. Caching Information for Scalability - Caching Overview, Caching with Amazon CloudFront, Caching with Amazon ElastiCache, Caching Strategies.

Unit-III : Introduction to Containers with AWS Lambda — 9

Introduction to Containers, Containers vs. Hardware Virtualization, Microservices – Use Case for Containers, Amazon Container Services. Developing Solutions with Amazon SQS and Amazon SNS - Introduction to Message Queues, Introduction to Amazon SQS, Amazon SQS Developer Concepts, Introduction to Amazon SNS, Amazon SNS Developer Concepts, Introduction to Amazon MQ. Developing Event – Driven solutions with AWS Lambda - Introduction to Serverless Computing with AWS Lambda, Overview of AWS Lambda, Execution Models for

Invoking Lambda Functions, AWS Lambda Permissions, Overview of Authoring and Configuring Lambda Functions, Overview of Deploying Lambda Functions.		
Unit-IV : Developing Solutions with Amazon API Gateway		9
Application Programming Interfaces, Amazon API Gateway, Creating a RESTful API, Controlling Access to a RESTful API, Testing a RESTful API, Deploying a RESTful API, Invoking a RESTful API, Monitoring a RESTful API. Developing solutions with AWS step functions - Workflow Coordination in Distributed Applications, Introduction to AWS Step Functions, State Types, AWS Step Functions Use Case, AWS Step Functions API. Developing secure application on AWS - Secure Network Connections, Manage Application Secrets, Authenticate with AWS Security Token Service, Authenticate with Amazon Cognito.		
Unit-V : Deploying Applications on AWS		9
Introducing DevOps Using AWScodeservicesforCI/CD, Introducing Deployment and Testing Strategies, Developing Applications with AWSElasticBeanstalk, Deploy applications AWSCloudFormation, Deploying Serverless applications AWSSAM.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Maverick Koston	AWS: Amazon Web Services, the Ultimate Guide for Beginners to Advanced	-	2020
2.	Mark Wilkins	Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud	-	2019
3.	Marcus Young	Implementing Cloud Design Patterns for AWS	-	2015

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Nathaniel Felsen	Effective DevOps with AWS	-	2018
2.	A.W.S. Smith	AWS: Amazon Web Services	-	2018
3.	Andreas Wittig and Michael Wittig	Amazon Web Services in Action	-	2015

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Course Code & Course Name	:	19CYE07&AWS Academy Cloud Developing Laboratory	L	T	P	C
			0	0	2	1

Course Objectives

1.	To Understand and study AWS Documentation and AWS Cloud9
2.	To create an IAM User and IAM Group
3.	To develop Amazon S3 and AWS Lambda and Amazon API Gateway
4.	To perform an activity RCUs and WCUs
5.	To demonstrate AWS Lambda with API Gateway.

Course Outcomes

1.	Generate AWS Cloud9
2.	Implement IAM user and Group
3.	Developing Amazon S3 and AWS Lambda and Amazon API Gateway
4.	Able to implement Docker Container.
5.	Demonstrate AWS Lambda with API Gateway.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE07.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE07.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE07.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE07.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE07.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	Activity - AWS Documentation Scavenger Hunt
2.	Introduction to AWS Cloud9
3.	Educator Demo - AWS Cloud9
4.	Educator Demo -Create an IAM User and IAM Group
5.	Developing with Amazon S3 using the AWS SDK
6.	Activity - Calculate Read Capacity Units (RCUs)
7.	Activity - Calculate Write Capacity Units (WCUs)
8.	Working with Docker Containers
9.	Developing with AWS Lambda and Amazon API Gateway using the AWS SDK

Total : 45

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Course Name	:	19CYE08&AWS Academy Cloud Architecting	L	T	P	C
			3	0	0	3

Course Objectives

1.	Illustrate howcloudadoptiontransformsthewayITsystemswork.
2.	IdentifythebenefitsofInfrastructureasCode.
3.	Summarizedatabaseservicesforstoringanddeployingweb-accessibleapplications.
4.	DescribehowtheAWSWell-ArchitectedFrameworkimprovescloud-basedarchitectures.
5.	Evaluatethemostimportantperformancemetricsforapplications

Course Outcomes

1.	Implement IT related work and access Amazon Web Services
2.	Develop code
3.	Construct real time database application using current techniques
4.	Populate Cloud based architectures
5.	Design real time application with performance metrics.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE08.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE08.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE08.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE08.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE08.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :Welcome to AWS Academy Cloud Architecting — 9

Course Prerequisites, Objectives, Overview, Creating AWS Training Portal Account, Accessing Course Materials. Designing Environment - Choosing a Region, Selecting Availability Zones, Virtual Private Cloud (VPC), Dividing VPCs and Subnets, Default VPCs and Default Subnets, Controlling VPC Traffic, Connecting Multiple VPCs, Integrating On-premises Components, VPC Best Practices. Designing for High Availabilty I - Load Balancing and Fault Tolerance, High Availability Across Regions, Connections Outside of Amazon VPC.

Unit-II : Designing for High Availability II and Infrastructure — 9

Designing for High Availabilty II - Best Practice – Scalability, Determining if Scaling is Needed, Automatic Scaling, Scaling Data Stores, AWS Lambda and Event Driven Scaling. Automating Infrastructure - Manual Environment Configuration, Infrastructure as code on AWS, Grouping resources in a template, Resources not supported by AWS CloudFormation. Decoupling Infrastructure - Loose Coupling, Loose Coupling Strategies, Communicating Easily and Reliably Among Components, Communicating with Loose Coupling and Amazon DynamoDB, Amazon API Gateway, Serverless Architectures, Decoupling Examples

Unit-III : Designing Web-Scale Media and Architected Framework — 9

Storing Web-Accessible Content with Amazon S3, Caching with Amazon Cloud Front, Managing NoSQL Databases, Storing Relational Data in Amazon RDS. Architected Framework - Introduction to the Well-Architected Framework, Pillars of the Well-Architected Framework, Well-Architected Design Principles. Operational Excellence - Principles of the Operational Excellence Pillar, Drive Operational Excellence, Operational Excellence Pillar Questions.

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Unit-IV : Well-Architected Pillars : Security, Reliability, PerformanceEfficiency	9
Security - Principles of the Security Pillar, Preventing Common Security Exploits, Securing Data in Cloud Front, Encrypting Data, Authentication. Reliability - Principles of the Reliability Pillar, Making Infrastructure More Reliable, Reliability Pillar Questions. Performance Efficiency - Principles of the Performance Efficiency Pillar, Infrastructure Efficiency Improvements, Performance Efficiency Pillar Questions and Best Practice.	
Unit-V : Well-Architected Pillars : Cost Optimization, Troubleshooting, Design Patterns and Sample Architectures	**9**
Cost Optimization - Principles of the Cost Optimization Pillar, Optimizing the Cost of Infrastructure, Dedicated Instances and Dedicated Hosts, Trusted Advisor, Optimizing Costs with Caching, AWS Cost Calculation Tools, Cost Optimization Questions. Troubleshooting - Troubleshooting Steps, AWS Support Options. Design Patterns - High-Availability Design Patterns, Stream Processing Example, Sensor Network Data Ingestion and Processing Example, Application Backend Example, Transcoding and Serving Video Files Example.	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Joe Baron, Biff Gaut, Hisham Baz, Tim Bixler, Sean Senior, Kevin E. Kelly, John Stamper	AWS Certified Solutions Architect Official Study Guide: Associate Exam	-	2016

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ben Piper, David Clinton	AWS Certified Solutions Architect Study Guide: Associate SAA-C01 Exam	-	2019
2.	Julian Gramm	The Complete Guide From Beginners To Advanced For Amazon Web Services	-	2019
3.	Ben Piper, and David Clinton	AWS Certified Solutions Architect Study Guide: Associate SAA-C01 Exam 2nd Edition	-	2018

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Course Name	:	19CYE08&AWS Academy Cloud Architecting	L	T	P	C
			3	0	0	3

Course Objectives

1.	Illustrate howcloudadoptiontransformsthewayITsystemswork.
2.	IdentifythebenefitsofInfrastructureasCode.
3.	Summarizedatabaseservicesforstoringanddeployingweb-accessibleapplications.
4.	DescribehowtheAWSWell-ArchitectedFrameworkimprovescloud-basedarchitectures.
5.	Evaluatethemostimportantperformancemetricsforapplications

Course Outcomes

1.	Implement IT related work and access Amazon Web Services
2.	Develop code
3.	Construct real time database application using current techniques
4.	Populate Cloud based architectures
5.	Design real time application with performance metrics.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE08.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE08.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE08.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE08.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE08.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :Welcome to AWS Academy Cloud Architecting — 9

Course Prerequisites, Objectives, Overview, Creating AWS Training Portal Account, Accessing Course Materials. Designing Environment - Choosing a Region, Selecting Availability Zones, Virtual Private Cloud (VPC), Dividing VPCs and Subnets, Default VPCs and Default Subnets, Controlling VPC Traffic, Connecting Multiple VPCs, Integrating On-premises Components, VPC Best Practices. Designing for High Availabilty I - Load Balancing and Fault Tolerance, High Availability Across Regions, Connections Outside of Amazon VPC.

Unit-II : Designing for High Availability II and Infrastructure — 9

Designing for High Availabilty II - Best Practice – Scalability, Determining if Scaling is Needed, Automatic Scaling, Scaling Data Stores, AWS Lambda and Event Driven Scaling. Automating Infrastructure - Manual Environment Configuration, Infrastructure as code on AWS, Grouping resources in a template, Resources not supported by AWS CloudFormation. Decoupling Infrastructure - Loose Coupling, Loose Coupling Strategies, Communicating Easily and Reliably Among Components, Communicating with Loose Coupling and Amazon DynamoDB, Amazon API Gateway, Serverless Architectures, Decoupling Examples

Unit-III : Designing Web-Scale Media and Architected Framework — 9

Storing Web-Accessible Content with Amazon S3, Caching with Amazon Cloud Front, Managing NoSQL Databases, Storing Relational Data in Amazon RDS. Architected Framework - Introduction to the Well-Architected Framework, Pillars of the Well-Architected Framework, Well-Architected Design Principles. Operational Excellence - Principles of the Operational Excellence Pillar, Drive Operational Excellence, Operational Excellence Pillar Questions.

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Unit-IV : Well-Architected Pillars : Security, Reliability, PerformanceEfficiency	9
Security - Principles of the Security Pillar, Preventing Common Security Exploits, Securing Data in Cloud Front, Encrypting Data, Authentication. Reliability - Principles of the Reliability Pillar, Making Infrastructure More Reliable, Reliability Pillar Questions. Performance Efficiency - Principles of the Performance Efficiency Pillar, Infrastructure Efficiency Improvements, Performance Efficiency Pillar Questions and Best Practice.	
Unit-V : Well-Architected Pillars : Cost Optimization, Troubleshooting, Design Patterns and Sample Architectures	**9**
Cost Optimization - Principles of the Cost Optimization Pillar, Optimizing the Cost of Infrastructure, Dedicated Instances and Dedicated Hosts, Trusted Advisor, Optimizing Costs with Caching, AWS Cost Calculation Tools, Cost Optimization Questions. Troubleshooting - Troubleshooting Steps, AWS Support Options. Design Patterns - High-Availability Design Patterns, Stream Processing Example, Sensor Network Data Ingestion and Processing Example, Application Backend Example, Transcoding and Serving Video Files Example.	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Joe Baron, Biff Gaut, Hisham Baz, Tim Bixler, Sean Senior, Kevin E. Kelly, John Stamper	AWS Certified Solutions Architect Official Study Guide: Associate Exam	-	2016

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ben Piper, David Clinton	AWS Certified Solutions Architect Study Guide: Associate SAA-C01 Exam	-	2019
2.	Julian Gramm	The Complete Guide From Beginners To Advanced For Amazon Web Services	-	2019
3.	Ben Piper, and David Clinton	AWS Certified Solutions Architect Study Guide: Associate SAA-C01 Exam 2nd Edition	-	2018

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Course Name	:	19CYE09&AWS Academy Cloud Architecting Laboratory	L	T	P	C
			0	0	2	1

Course Objectives

1.	Formulate Auto scaling with AWS Lambda.
2.	To Summarize AWS Cloud formation.
3.	To decouple the infrastructure.
4.	To implement Serverless Architecture and Amazon CloudFront
5.	To Develop Amazon Route 53 and sandbox

Course Outcomes

1.	Develop Auto scaling with AWS Lambda.
2.	Deploy AWS Cloud formation.
3.	Decoupling the infrastructure.
4.	To implement Serverless Architecture and Amazon CloudFront
5.	Construct Amazon Route 53 and sandbox

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE09.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE09.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE09.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE09.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE09.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	Making Environment Highly Available
2.	Using Auto Scaling with AWS Lambda
3.	Automating Infrastructure Deployment with AWS Cloud Formation
4.	Decoupling Infrastructure
5.	Implementing a Serverless Architecture with AWS Managed Services
6.	Introduction to Amazon CloudFront
7.	Multi-Region Failover With Amazon Route 53
8.	Sandbox
9.	Making Environment Highly Available

Total : 45

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Course Name	:	19CYE10&AWS Academy Cloud Foundation	L	T	P	C
			2	0	0	1

Course Objectives

1.	Describe three cloud deployment models, and Overview of AWS Global infrastructure.
2.	Understand the different AWS core services.
3.	Formulate virtual firewalls with security groups.
4.	Review the availability differences of alternative database solutions.
5.	Summarize the AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes

1.	Construct three cloud deployment models, and Overview of AWS Global infrastructure.
2.	Implement the different AWS compute services.
3.	Create virtual firewalls with security groups.
4.	Construct the availability of different alternative database solutions.
5.	Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE10.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE10.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE10.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE10.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE10.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Cloud Concepts	9

Cloud Concepts Overview - Introduction to Cloud Computing, Advantages of Cloud Computing, Introduction to Amazon Web Services (AWS), AWS Cloud Adoption Framework (CAF). Cloud Economics - Fundamentals of Pricing, Total Cost of Ownership, AWS Global Infrastructure Overview - AWS Global Infrastructure, AWS Service and Service Category Overview.

Unit-II : AWS Core Services	9

Compute - Compute Services Overview, Introduction to Amazon Elastic Compute Cloud (EC2), Amazon EC2 Cost Optimization, Introduction to AWS Lambda, Introduction to AWS Elastic Beanstalk. Storage - Amazon Elastic Block Store (EBS), Amazon Simple Storage Service (S3), Amazon Elastic File System (EFS), Amazon Glacier. VPC - Amazon Virtual Private Cloud (VPC), Amazon VPC Security Groups, Amazon CloudFront,. Database - Amazon Relational Database Service (RDS), Amazon DynamoDB, Amazon Redshift, Amazon Aurora. Balancing, Scaling, Monitoring - Elastic Load Balancing (ELB), Amazon CloudWatch, Auto Scaling.

Unit-III : Cloud Security	9

AWS Shared Responsibility Model, AWS Identity and Access Management (IAM), AWS Trusted Advisor, AWS CloudTrail, AWS Config, AWS Day One Best Practice Review, AWS Security and Compliance Programs, AWS Security Resources.

Unit-IV : Cloud Architecting	9

Introduction to the Well-Architected Framework, Well-Architected Design Principles, Understanding Reliability and High Availability.

Unit-V : Cloud Support	9

Introduction to AWS Organizations, AWS Cost Explorer, Overview of AWS Technical Support Plans and Costs.

	Total	:	45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
3.	Cloud Experts	The AWS Handbook	-	2018
4.	Dan Sullivan	Official Google Cloud Certified Associate Cloud Engineer Study Guide	-	2019

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
6.	Ben Piper, David Clinton	AWS Certified Cloud Practitioner Study Guide: CLF-C01 Exam	Addison-Wesley Professional	June 2019
7.	Mark Wilkins	Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud	Addison-Wesley Professional	July 2019
8.	Ben Piper, David Clinton	AWS Certified Cloud Practitioner Study Guide	Sybex	July 2019

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Course Name	:	19CYE11&AWS ACADEMY CLOUD FOUNDATION LABORATORY	L	T	P	C
			0	0	2	1

Course Objectives

1.	To understand and study Amazon EC2
2.	To work with EBS.
3.	To build VPC, web server and DB server
4.	To build the DB Server.
5.	To construct scale and load balance of cloud architecture.

Course Outcomes

1.	Construct Amazon EC2
2.	Working with EBS
3.	Develop VPC, web server and DB server
4.	Build the DB Server.
5.	Implement scale and load balance of cloud architecture.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYE11.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE11.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE11.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE11.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE11.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	Introduction to Amazon EC2
2.	Working with EBS
3.	Build VPC and Launch a Web Server
4.	Build DB Server and Interact with DB Using an App
5.	Scale and Load Balance Architecture
6.	Introduction to AWS IAM
7.	Sandbox
	Total : 30

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Course Name	:	19CYE12&ETHICAL HACKING AND CYBER FORENSICS	L	T	P	C
			3	0	0	3

Course Objectives

1.	To render all the techniques used for penetration testing for performing security auditing
2.	To transform the internet security industry by infusing professionalism and efficiency
3.	To discover Remote Control Insecurities
4.	To Understand the Digital Investigation and its technology.
5.	To Learn Methods of storing data and forensic artifacts

Course Outcomes

1.	Perform system vulnerability exploit attacks
2.	Learn various hacking methods
3.	Examine Advanced HijackingTechniques and cryptography method
4.	Apply the process in taking digital investigation
5.	Explain different methods of storing data and file formats

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
19CYE12.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE12.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE12.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE12.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE12.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :Casing the Establishment

What is footprinting- Internet Footprinting - Scanning-Enumeration - basic banner grabbing, Enumerating Common Network services. Securing permission - Securing file and folder permission. Using the encrypting file system. Securing registry permissions. Securing service- Managing service permission. Default services in windows 2000 and windows XP. Unix - The Quest for Root. Remote Access vs Local access. Remote access. Local access. After hacking root.

Unit-II :Network Hacking

Dial-up ,PBX, Voicemail, and VPN hacking - Preparing to dial up. War- Dialing. Brude-Force Scripting PBX hacking. Voice mail hacking, VPN hacking. Network Devices – Discovery, Autonomous System Lookup. Public Newsgroups, Service Detection. Network Vulnerability, Detecting Layer 2 Media.

Unit-III :Remote Control Insecurities

Connection. Weakness.VNC . Microsoft Terminal Server and Citrix ICA .Advanced Techniques Session Hijacking. Back Doors. Trojans. Cryptography . Subverting the systems Environment. Social Engineering. Web Hacking. Web server hacking web application hacking. Hacking the internet User - Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global Counter measures to Internet User Hacking.

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Unit-IV :Digital Investigation	
Digital Investigation - Digital Evidence and Computer Crime - History and Terminology of Computer Crime Investigation - Technology and Law - The Investigative Process -Investigative Reconstruction - Modus Operandi, Motive and Technology - Digital Evidence in the Courtroom.	
Unit-V :Understanding information	**9**
Methods of storing data: number systems, character codes, record structures, file formats and file signatures - Word processing and graphic file formats - Structure and Analysis of Optical Media Disk Formats - Recognition of file formats and internal buffers - Extraction of forensic artifacts– understanding the dimensions of other latest storage devices – SSD Devices.	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Stuart McClure, Joel Scambray and Goerge Kurtz,	"Hacking Exposed Network Security Secrets & Solutions"	Tata Mcgrawhill Publishers	2010
2.	Bensmith, and Brian Komer	"Microsoft Windows Security Resource Kit"	Prentice Hall of India	2010

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Hein, Hilary Morrison	Ethical Hacking	Create Space Independent Publishing Platform	2018
2.	Patrick Engebretson ·	The Basics of Hacking and Penetration Testing	Elsevier Science	2013
3.	Rafay Baloch	Ethical Hacking and Penetration Testing Guide	CRC Press	2017

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Course Code & Course Name	:	19CYE13&Ethical hacking Laboratory	L	T	P	C
			0	0	2	1

Course Objectives

1.	Install, configure, use and manage hacking software on a closed network environment
2.	Evaluate best practices in security concepts to maintain confidentiality, integrity and availability of computer systems
3.	Execute a penetration test using standard hacking tools in an ethical manner.
4.	Plan a vulnerability assessment and penetration test for a network.
5.	Determine the type of attack used and pinpoint exploit code in network traffic

Course Outcomes

1.	Analyze and resolve Cybersecurity through the application of systematic approaches
2.	Explore wireless network hacking
3.	Demonstrate the ability to attack and defend a network.
4.	Investigate trojans and other attacks
5.	Explore hacking through the network: Sniffers and evasion

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE13.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE13.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE13.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE13.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE13.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	Scanning Options
2.	Analyze Browser-Based Heap Spray Attack
3.	Analyze SQL Injection Attack
4.	Analyze Various Data Sources to Confirm Suspected Infection
5.	Automated Vulnerability Assessments
6.	Core Impact Vulnerability Scan
7.	Core Impact Web Application Penetration Testing
	Total : 45

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Course Name	:	19CYE14&Computer Forensics Analysis& Investigation	L	T	P	C
			3	0	0	3

Course Objectives

1.	To correctly define and cite appropriate instances for the application of computer forensics Correctly collect and analyze computer forensic evidence
2.	Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics
3.	Explain how to conduct a digital forensics investigation, including the concept of the chain of evidence.
4.	Report findings from digital forensic investigations.
5.	Perform recovery of digital evidence from various digital devices using a variety of software utilities.

Course Outcomes

1.	Students discuss the use of different computer forensic tools.
2.	Identify the process in taking digital evidence.
3.	Describe how to conduct an investigation using methods of memory, operating system, network and email forensics.
4.	Assess the different forensics tools.
5.	Differentiate among different types of security attacks.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE14.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE14.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE14.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE14.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE14.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :Computer forensics analysis	9

Determining what data to collect and analyze. Addressing data hiding techniques, Hiding partitions, Marking bad cluster, Bit –shifting, using steganography to hide data, Examining encrypted files, Recovering Passwords, Performing Remote Acquisitions, Remote Acquisitions with Runtime Software.

Unit-II : Recovering graphics files	9

Understanding vector Graphics, Understanding graphics file formats .Lossless and lossy compression. Identifying graphics file fragments, Repairing Damaged Headers, Searching for and carving data from unallocated space. Understanding steganography in graphics files. Using steganalusis tools. Understanding copyright issues with graphics.

Unit-III : Virtual Machines, Network forensics, and Live Acquit ions	9

Performing live acquit ions, Performing a live acquit ion in windows, Developing standard procedures for network forensics, Reviewing network logs. Using network tools, using Unix/Linux tools. Using packet sniffers, examining the honey net projects.

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Unit-IV : E-Mail Investigation	9
Exploring the role of email investigation, Exploring the role of client and server in email, Investigating E-mail crimes and violations, Examining E-mail Messages, Viewing E-mail headers, Examing E-mail headers, Examining additional E-mail files. Tracing an e-mail message, Using network E-mail logs, Understanding E-mail servers, Examining Unix e-mail server logs, Examining Microsoft email server logs.	
Unit-V : Cell phone and mobile device forensics	**9**
Understanding mobile device forensics, Mobile phone basics, inside mobile devices, inside PDAs, Understanding acquisition procedures for cell phones and mobile devices, Mobile forensics equipment.	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bill Nelson,Amelia Phillips,Christopher Steuart	Guide to Computer Forensics and Investigations	Fourth Edition,Course Technology	
2.	Angus M.Marshall	Digital forensics: Digital evidence in criminal investigation	John – Wiley and Sons	2008

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Eoghan Casey	Handbook of Digital Forensics and Investigation	Elsevier	2009
2.	John Sammons	The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics	Elsevier	2011
3.	Amelia Phillips, Bill Nelson, and Christopher Steuart	Guide to Computer Forensics and Investigations	Booktopia	2003

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Course Code & Course Name	:	19CYE15&Computer Forensics Laboratory	L	T	P	C
			0	0	2	1

Course Objectives

1.	Conduct digital investigations that conform to accepted professional standards
2.	Identify and document potential security breaches of computer data
3.	Apply a solid foundational grounding in computer networks, operating systems, file systems
4.	Explain and perform forensic analysis in various operating system environments.
5.	Select and apply current computer forensics tools.

Course Outcomes

1.	Demonstrate the recovery of image files.
2.	Perform e-mail investigations.
3.	Act as expert witness and report results of investigations.
4.	Identify and apply current practices for data discovery recovery and acquisition.
5.	Conduct basic network forensic analysis.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE15.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE15.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE15.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE15.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE15.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

List of Experiments

1.	Recovering Graphics Files
2.	Digital Forensics Analysis and Validation
3.	Virtual Machine Forensics
4.	Live Acquisitions, and Network Forensics
5.	Email/Social Media Investigations
6.	Mobile Device Forensics
7.	Disk Forensics and Data Recovery
8.	Steganography
9.	Key loggers
10.	Network monitors

Total : 45

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Course Name	:	19CYE16&SEMANTIC WEB	L	T	P	C
			3	0	0	3

Course Objectives

1.	To learn Web Intelligence
2.	To learn Knowledge Representation for the Semantic Web
3.	To learn Ontology Engineering
4.	To learn Semantic Web Applications, Services and Technology
5.	To learn Social Network Analysis and semantic web

Course Outcomes

1.	Understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web.
2.	Understand the concepts of Web Science, semantics of knowledge and resource, ontology.
3.	Describe logic semantics and inference with OWL.
4.	Use ontology engineering approaches in semantic applications
5.	To perform social network k analysis for different applications

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE16.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE16.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE16.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE16.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE16.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Web Intelligence — 9

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

Unit-II : Knowledge Representation for the Semantic Web — 9

Ontologies and their role in the semantic web,Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

Unit-III : Ontology Engineering — 9

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

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Unit-IV : Semantic Web Applications, Services and Technology		**9**
Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.		
Unit-V : semantic Patterns and Tools, Challenges and Opportunities		**9**
Patterns in Software Design, Pattern Frame, Semantic Patterns, Semantic Tools, Semantic Web Services Tools, Semantic Doubts, Semantic Opportunities and Challenges.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Berners Lee, Godel and Turing	Thinking on the Web	Wiley inter science	2008

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	J. Davies, R. Studer, P. Warren, John Wiley & Sons	Semantic Web Technologies, Trends and Research in Ontology Based Systems	Wiley inter science	2006
2	Liyang Lu Chapman	Information sharing on the semantic Web	CRC Publishers, (Taylor & Francis Group)	2006

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Course Name	:	19CYE17&NETWORK PROGRAMMING AND MANAGEMENT	L	T	P	C
			3	0	0	3

Course Objectives

1.	To Explain socket programming to design client serverenvironment
2.	Tounderstandthebasicsofsocket programmingusingTCPandUDPSockets
3.	To analyze the socket options and Internet protocolinteroperability
4.	To develop macros for including objects in MIBstructure.
5.	T o Understand SNMPv1, v2 and v3 protocols & practicalissues

Course Outcomes

1.	Apply socket structure and functions to client serverapplications
2.	Design applications using TCP andUDP sockets
3.	Implement socket options and advanced sockets toapplications
4.	Comparenumberofvariationsofthenetworkmanagementarchitecture
5.	Configure and manage network services and networkarchitecture

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE17.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE17.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE17.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE17.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE17.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : SOCKET STRUCTUREANDFUNCTIONS — 9

Introduction to Socket Programming - OSI Layer and Services - Overview of TCP/IP Protocols - Socket Introduction - Socket address Structures - Value - Result Arguments - Byte Ordering Functions Byte Manipulation Functions - Elementary TCP sockets - Socket, connect, bind, listen, accept, fork and exec functions, concurrent servers - Close function

Unit-II :TCP ANDUDPSOCKETS — 9

TCP Echo Server - TCP Echo Client - Posix Signal handling - TCP Echo server functions Normal startup-terminate and signal handling server process termination - Crashing and Rebooting of server host - shutdown of server host - I/O multiplexing - I/O Models - select function - shutdown function - pselect function - poll function- Multiplexing TCP Sockets - TCP socket options - Elementary UDP sockets - UDP echo Server - UDP echo Client - Multiplexing UDP sockets

Unit-III :SOCKET OPTIONS ANDADVANCEDSOCKETS — 9

Socket options - getsocket and setsocket functions - generic socket options - IP socket options - ICMP socket options - Domain name system - gethostbyname function - gethostbyadr function - getservbyname and getservbyport functions Ipv4 and Ipv6 interoperability - threaded servers - thread creation and termination- Mutex - condition variables - raw sockets - raw socket creation - raw socket output - raw socket input - ping program - trace route program

Unit-IV :SIMPLENETWORKMANAGEMENT		9
SNMP network management concepts - SNMPv1 - Management information - MIB Structure - Object syntax - Standard MIBs - MIB-II Groups - SNMPv1 protocol and Practical issues		
Unit-V :SNMP ENHANCEDFEATURESANDRMON		**9**
Introduction to SNMPv2 - SMI for SNMPV2 - Protocol - SNMPv3 - Architecture and Applications - Security and access control model - Overview of RMON		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	W. Richard Stevens, Bill Fenner Andrew M. Rudoff	Unix Network Programming Vol-I	Pearson Education	2015
2.	Mani Subramaniam	Network Management: Principles and Practice	PHI	2012

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
6.	Iresh A. Dhotre, V.S.Bagad	Network Programming & Management	Technical Publications	2009
7.	William Stallings	SNMP, SNMPV2, SNMPV3 and RMON 1 and 2	Addison Wesley	1999
8.	D. E. Comer	Internetworking with TCP/IP Vol - IIII, (BSD Sockets Version), 2nd Edition	Prentice Hall of India	2003

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Course Name	:	19CYE18&Business Intelligence	L	T	P	C
			3	0	0	3

Course Objectives

1.	To understand the businessintelligence architectures.
2.	T o develop a foundation in Business Intelligence (BI) for Business Analysis through knowledge delivery.
3.	T o understand the different aspects of the BI environment, and dataenvelopment analysis.
4.	To implementation methodology and project life cyclebusiness intelligence
5.	To understand the management and future of businessintelligence

Course Outcomes

1.	Explain about businessintelligence architectures.
2.	Summarizevariousknowledgedeliverymethods
3.	Summarize data envelopmentanalysis
4.	Implement the business intelligent system for realtime application.
5.	Explainthemanagementandfutureofbusinessintelligentsystem.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE18.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE18.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE18.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE18.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE18.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : BUSINESSINTELLIGENCE — 9

Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business Intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

Unit-II : KNOWLEDGEDELIVERY — 9

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

Unit-III :DATAENVELOPMENTANALYSIS — 9

Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models.

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Unit-IV :BUSINESS INTELLIGENCE IMPLEMENTATION: INTEGRATION AND EMERGING TRENDS	9
Implementing BI – Overview – BI and Integration Implementation – Connecting BI System to Database and other Enterprise Systems – On-Demand BI – Issues of Legality, Privacy, and Ethics – Emerging Topics in BI – The Rise of Collaborative Decision Making	
Unit-V :MANAGEMENTANDFUTUREOFBUSINESSINTELLIGENCE	**9**
Development of BI - Business Intelligence System - Reporting system - Data Warehouse - Data Mart- Knowledge Management Systems - Discussion and Case Study – The Future of Business Intelligence.	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David Loshin Morgan, Kaufman	Business Intelligence: TheSavy Managers Guide	Wiley Publications	2012
2.	Efraim Turban, Ramesh Sharda, Jay E.Aronson, David King	Business Intelligence: A Managerial Approach	Pearson Education	2011

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Efraim Turban, Ramesh Sharda, Dursun Delen,	Decision Support and Business Intelligence Systems	Pearson	2013
2.	Rajiv Sabherwal, Irma Becerra- Fernandez	Business Intelligence Practices, Technologies, and Management	Wiley	2011
3.	Carlo Vercellis	Business Intelligence: Data Mining and Optimization for Decision Making	Wiley Publications	2009

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Course Name	:	19CYE19&Wireless Sensor Networks	L	T	P	C
			3	0	0	3

Course Objectives

1.	To understand basic sensornetwork concepts
2.	To know physical layer issues, medium Access controlProtocols
3.	Tocomprehendnetworklayercharacteristicsand protocolsand transportlayerissuesand protocols
4.	To understand the network management in Wirelesssensor network.
5.	To understand theMiddleware services

Course Outcomes

1.	To understand basic sensornetwork concepts
2.	To know physical layer issues, medium Access controlProtocols
3.	Tocomprehendnetworklayercharacteristicsand protocolsand transportlayerissuesand protocols
4.	To understand the network management in Wirelesssensor network.
5.	To understand theMiddleware services

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE19.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE19.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE19.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE19.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE19.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : INTRODUCTION — 9

Introduction to wireless sensor networks - Challenges and Constraints - Application of sensor networks ode architecture - Operating System - Fundamental aspects.

Unit-II :PHYSICAL LAYER ANDMEDIUM ACCESSLAYER — 9

Basic architectural framework – Physical layer – source encoding –channel encoding – modulation – medium access control- Wireless MAC protocols – Characteristics of MAC protocols in sensor networks – Contention free MAC protocols - traffic adaptive medium access - Low-Energy Adaptive Clustering Hierarchy –Contention based protocols - Power Aware Multi-Access with Signaling - Data-Gathering MAC - Receiver-Initiated MAC.

Unit-III : - NETWORK LAYER ANDTRANSPORTLAYER — 9

Routing metrics – Data centric Routing - Proactive routing – OLSR – Reactive Routing – AODV – Location Based Routing - Traditional Transport Control Protocols - TCP (RFC 793) - UDP (RFC 768) - Mobile IP - Feasibility of Using TCP or UDP for WSNs - Transport Protocol Design Issues – Examples of Existing Transport Control Protocols- CODA (Congestion Detection and Avoidance).

Unit-IV :NETWORKMANAGEMENT — 9

Power Management - Local Power Management Aspects - Processor Subsystem - Communication Subsystem - Active Memory - Power Subsystem- Dynamic Power Management - Dynamic Operation

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Modes - Time Synchronization – Clocks and the Synchronization Problem - Time Synchronization in Wireless Sensor Networks - Reasons for Time Synchronization - Challenges for Time Synchronization - Basics of Time Synchronization - Synchronization Messages Non determinism of Communication Latency -Time Synchronization Protocols Lightweight Tree-Based Synchronization - Timing-sync Protocol for Sensor Networks Localization -Ranging Techniques -Time of Arrival - Time Difference of Arrival - Angle of Arrival - Received Signal Strength - Range- Based Localization - Triangulation - Range-Free Localization - Ad Hoc Positioning System (APS) .	
Unit-V :MIDDLEWARE FORWIRELESSSENSORNETWORKS	**9**
Introduction -WSN Middleware Principles - Middleware Architecture – Data Related Functions, Architectures – Case study - MiLAN (Middleware Linking Applications and Networks) - IrisNet (Internet-Scale Resource- Intensive Sensor Networks Services).	
Total : 45	

TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dr.Xerenium, Shen, Dr. Yi Pan	Fundamentals of Wireless Sensor Networks, Theory and Practice	Wiley Series	2010
2.	H. Karl and A. Willig	Protocols and Architectures for Wireless Sensor Networks	John Wiley & Sons	2005

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Kazem Sohraby, Daniel Manoli	Wireless Sensor networks-Technology, Protocols and Applications	Wiley Inter Science Publications	2007
2	Bhaskar Krishnamachari	Networking Wireless Sensors	Cambridge university press	2005.
3	C. S. Raghavendra,K. M. Sivalingam, andT.	Wireless Sensor Networks	John Wiley & Sons	2007
4	N.P. Mahalik	Sensor Networks and Configuration: Fundamentals, Standards, Platforms, and	Springer	2006

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Course Name	:	19CYE20&INFORMATIONRETRIEVALTECHNIQUES	L	T	P	C
			3	0	0	3

Course Objectives

1.	ToknowaboutInformationretrievalsystemstrategies.
2.	TolearnWebSearchEngineandComparevarioustypesofretrievalutilities.
3.	ToknowaboutInformationRetrievalmodelingtechniques
4.	ToIdentifyvariouswebbasedinformationretrievaltechniquesusingmoderntools.
5.	To understand information retrieval techniques in XML retrieval andmultimedia

Course Outcomes

1.	Explain the factors which optimize the information retrievalprocess
2.	Understand web based information retrievaltechniques
3.	Identify the techniques of Information Retrievalmodeling
4.	Applyparallelinformationretrievalmodelsanddistributedinformationretrievalmodelsinrealtime problem.
5.	SummarizevariousstepsinvolvedinXMLandmultimediainformationretrievaltechniques

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE20.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE20.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE20.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE20.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE20.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : INTRODUCTION — 9

Introduction - History of IR- The IR problem – Software Architectures of the IR system – The retrieval and ranking processes – Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

Unit-II : WEB RETRIEVAL ANDWEBCRAWLING — 9

Web retrieval – Introduction – The web – search engine architectures – search engine ranking – managing web data – search engine user interaction – browsing – Web crawling – Introduction – Applications of web crawler – Architecture and implementation

Unit-III : INFORMATIONRETRIEVALMODELING — 9

IR Models-Modeling and Ranking - A Taxonomy of IR Models - Classic Information Retrieval -The Boolean Model – TF - IDF Weights - Document Length Normalization - The Vector Model- The Probabilistic Model - Alternative Set Theoretic Models - Set-Based Model - Extended Boolean Model-Fuzzy Set Model - Alternative Algebraic Models - Generalized Vector Space Model - Latent Semantic Indexing Model - Neural Network Model - Alternative Probabilistic Models - BM25 - Language Models - Divergence from Randomness – Bayesian NetworkModels

Unit-IV : PARALLEL AND DISTRIBUTED INFORMATION RETRIEVAL	9
Distributed Information Retrieval – Introduction – A taxonomy of Distributed IR systems – Theoretical Model – Data partitioning – Parallel IR – Introduction – Parallel Indexing – Clustering and Classification – Parallel Systems – Parallel IR on MIMD architectures – parallel IR on SIMD architectures – Cluster based IR – Retrieval in peer to peernetworks.	
Unit-V : XMLRETRIEVALANDMULTIMEDIAINFORMATIONRETRIEVAL	**9**
XML Retrieval – Introduction – XML retrieval evaluation – Query Languages – Multimedia Information Retrieval –The challenges – Content based image retrieval – Audio and Music retrieval – Retrieving and browsingvideo.	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ricardo Baeza - Yates and Berthier Ribeiro - Neto	Modern Information Retrieval: The Concepts and Technology behind search	2nd Edition, ACM Press Books	2011
2.	Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack	Information Retrieval: Implementing and Evaluating Search Engines	The MIT Press	2010
3.	Ricardo Baeza - Yates and Berthier Ribeiro - Neto	Modern Information Retrieval: The Concepts and Technology behind search	2nd Edition, ACM Press Books	2011

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	G.G. Chowdhury	Introduction to Modern Information Retrieval	Neal- Schuman Publishers, Third Edition	2010
2.	Mark Levene	An Introduction to Search Engines and Web Navigation	2nd Edition Wiley	2010
3.	Bruce Croft, Donald Metzler and Trevor Strohman	Search Engines: Information Retrieval in Practice	1st Edition Addison Wesley	2009
4.	Christopher D. Manning, PrabhakarRaghavan, Hinrich Schütze	An Introduction to Information Retrieval	Cambridge University Press, Cambridge, England	2008
5.	David A. Grossman, Ophir Frieder	Information Retrieval: Algorithms, and Heuristics	Academic Press, Second Edition	2008

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Course Name	:	19CYE21&SERVICEORIENTEDARCHITECTURE	L	T	P	C
			3	0	0	3

Course Objectives

1.	TostudytheimportanceofServiceOrientedArchitecture.
2.	ToprovideanoverviewofXMLTechnologyandmodelingdatabasesinXML
3.	TointroduceSecuritysolutionsinXMLandWebServicesandtointroduceSecuritystandardsforWeb Services
4.	TolearntoimplementSOAin theJ2EEand.Netenvironment
5.	T oImplementthevariousadvancedwebservicesusingJ2EE

Course Outcomes

1.	Explain the fundamental principles ofSOA
2.	Develop a simple XML services using SOAprinciples
3.	Develop a simple web services using SOAprinciples
4.	Model and analyze the JAVA web services andarchitecture.
5.	Implement the various advanced web services usingJ2EE

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
19CYE21.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE21.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE21.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE21.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE21.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : INTRODUCTION 9

The Evolution of SOA –Characteristics of SOA – Introducing SOA- Service oriented analysis – Business- centric SOA – Deriving business services- service modeling - Service Oriented Design- SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design– Task centric business service design

Unit-II : XMLSERVICES 9

XML document structure – Well formed and valid documents – Namespaces – DTD – XML Schema – X- Files- Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML

Unit-III : WEB SERVICESAND SOA 9

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination-Atomic Transactions – Business activities – Orchestration – Choreography- Service layer abstraction –Application Service Layer – Business Service Layer – Orchestration Service Layer.

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Unit-IV : JAVA WEBSERVICESARCHITECTURE	9
Java Web Service Developer pack– JAXP- Architecture-SAX-DOM-XSLT-JDOM-JAX RI – JAX- RPC- Service Model - JAX RPC and J2EE - JAXM – JAXM Architecture –JAXR - Registries and Repositories – JAXR Architecture – JAXR Information Model - JAXB – Architecture – Developing with JAXB - XML to Java mapping – JAXB API - Validation with JAXB – Customizing JAXB.	
Unit-V : EXTENDED WEBSERVICESSPECIFICATION	9
Metadata Management - Metadata Specification - Policy – Metadata exchange – Web Services Security–Core concepts – Challenges - Threads and Remedies – Message Level Security – Data Level Security – Advanced Messaging – Reliable Messaging - Notification – Transaction Management - Protocols and Specification – TransactionSpecification	
Total : 45	

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Eric Newcomer, Greg Lomow	Understanding SOA with Web Services	Pearson Education	2005
2.	James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew	Java Web Services Architecture	Elsevier	2003
3.	Eric Newcomer, Greg Lomow	Understanding SOA with Web Services	Pearson Education	2005

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Thomas Erl	Service Oriented Architecture	Pearson Education	2005.
2.	Frank Cohen	Fast SOA	Elsevier	2007
3.	Scott Campbell, Vamsi Mohun,	Mastering Enterprise SOA	Wiley	2007

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Course Name	:	19CYE22&Agile Technology	L	T	P	C
			3	0	0	3

Course Objectives

1.	T o Identify core agileprinciples
2.	T o Describe agile requirement over traditional methods of softwaredevelopment
3.	T o Understand Extreme ProgrammingConcepts.
4.	To develop theagile products.
5.	T o Demonstrate the advanced techniques of AgileMethods

Course Outcomes

1.	Applyagileprinciplesandpracticesinanactualproject.
2.	PreparetheDocumentandassessanagileproject.
3.	ApplyExtremeProgramminginagiletechnology.
4.	Explain the steps of releasingagile product.
5.	Demonstrate the advanced techniques of AgileMethods

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE22.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE22.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE22.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE22.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE22.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : INTRODUCTION TO AGILESOFTWAREDEVELOPMENT — 9

Agile Software Development-Cayman design- Organizational Culture Considerations with Agile - eam Members'Viewpoint- Manager's Viewpoint- Executive's Viewpoint- Different Types of Agile- Extreme Programming (XP)- Scrum- Feature-Driven Development- Dynamic Systems Development Method- Kanban Method- Crystal Family- Certification - Different Roles- Deep Dive into Scrum Roles- Roles in Other Methodologies

Unit-II :AGILEREQUIREMENTS — 9

Agile Software Development-Cayman design- Organizational Culture Considerations with Agile - eam Members'Viewpoint- Manager's Viewpoint- Executive's Viewpoint- Different Types of Agile- Extreme Programming (XP)- Scrum- Feature-Driven Development- Dynamic Systems Development Method- Kanban Method- Crystal Family- Certification - Different Roles- Deep Dive into Scrum Roles- Roles in Other Methodologies

Unit-III : EXTREMEPROGRAMMING — 9

XP Life Cycle-XP Team-XP Concepts-Prerequisite of XP-Recommendation of XP-Pair Programming- Energized Work-Informative Workspace-Root-Cause Analysis-Retrospectives-Collaborating-Team Strategy- Organizational Strategy-Sit Together-Real Customer Involvement-Ubiquitous Language-Coding Standards- Iteration Demo-Reporting

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Unit-IV : RELEASINGAGILEPRODUCTS		9
Done Done-No Bugs-Version Control-Continuous Integration-Collective Code Ownership-documentation- Planning-Vision-Release Planning-Planning Game-Risk Management-Iteration Planning-Slack- Stories- Estimating-		
Unit-V : VMASTERINGAGILITY		9
Developing-Incremental Requirements-Customer Tests-Test Driven Development-Refactoring-Simple Design- Incremental Design and Architecture-Spike Solutions-Performance Optimization-Exploratory Testing Values and Principles-Improve the Process-Rely on People-Eliminate Waste-Deliver Value-Seek Technical Excellence- CaseStudy		
Total	**:**	**45**

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Sondra Ashmore, Kristin Runyan	Introduction to Agile Methods	Addison-Wesley Professional	2014
2.	James Shore, Shane Warden	The Art of Agile Development	O'REILLY	2008

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Woodward,E.Surdeck	A Practical guide to Distributed Scrum	Addison-wesley	2010
2.	Dean Leffingwell	Agile Software Requirements	Agile software Development Series	2010
3.	Kent ,Beck	Extreme Programming Explained	Pearson Education	2008
4.	Larman	Agile and iterative development: A Managers Guide	Addison-wesley	2004
5.	Anderson, David	Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results	Prentice Hall	2003

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Course Name	:	19CYE23&SOCIAL NETWORK ANALYSIS	L	T	P	C
			3	0	0	3

Course Objectives

1.	Understand the concept of semantic web and related applications.
2.	Learn knowledge representation using ontology.
3.	Understand human behaviour in social web and related communities
4.	Learn to handle privacy related issues
5.	Learn visualization of social networks

Course Outcomes

1.	Develop semantic web related applications.
2.	Represent knowledge using ontology.
3.	Predict human behaviour in social web and related communities.
4.	Handle privacy related issues
5.	Visualize social networks.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE23.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE23.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE23.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE23.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE23.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :SOCIAL NETWORK ANALYSIS — 9

Social Network Analysis: History, Concepts and Research - Structure and Dynamics of Social Networks - Analysis of Social Networks - Analyzing the Dynamics of Communication in Online Social Networks - Qualitative Analysis of Commercial Social Network Profiles - Analysis of Social Networks Extracted from Log Files - Perspectives on Social Network Analysis for Observational Scientific Data - Modeling Temporal Variation in Social Network: An Evolutionary web graph approach - Churn in Social Networks.

Unit-II : SOCIAL MEDIA MINING AND SEARCH — 9

Discovering Mobile Social Networks - Online Identities and Social Networking - Detecting Communities - Concept Discovery in Youtube.com - Mining Regional Representative Photos from Consumer- Generated Geo tagged Photos - Collaborative Filtering Based on Choosing a Different Number of Neighbors - Discovering Communities from Social Networks

Unit-III : SOCIAL NETWORK INFRASTRUCTURES AND COMMUNITIES — 9

Decentralized Online Social Networks - Multi-Relational Characterization of Dynamic Social Network Communities- Accessibility Testing of Social Websites - Understanding and Predicting Human Behavior for Social Communities- Associating Human-Centered Concepts with Social Networks Using Fuzzy Sets

Unit-IV : PRIVACY IN ONLINE SOCIAL NETWORKS — 9

Managing Trust in Online Social Networks - Security and Privacy in Online Social Networks - Investigation of Key-Player Problem in Terrorist Networks Using Bayes Conditional Probability - Optimizing Targeting of Intrusion Detection Systems in Social Networks - Security Requirements for Social Networks in Web 2.0

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Unit-V :VISUALISATION AND APPLICATIONS OF SOCIAL NETWORKS		9
Visualization of Social Networks - Novel Visualizations and Interactions for Social Networks Exploration- Applications of Social Network Analysis - Online Advertising in Social Networks - Social Bookmarking on a Company's Intranet: A Study of Technology Adoption and Diffusion.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Furht, Borko	Handbook of Social NetworkTechnologies and Applications	Springer	2010
2.	Giles, Mark Smith, John Yen	Advances in Social Network Mining and Analysis	Springer	2010
3.	Furht, Borko	Handbook of Social NetworkTechnologies and Applications	Springer	2010

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Max Chevalier, Christine Julien and Chantal Soul- Dupuy	Collaborative and Social Information Retrieval and Access: Techniques for Improved User Modelling	IGI Global snippet	2010
2.	Charu C. Aggarwal	Social Network Data Analytics	Springer	2011
3.	Guandong Xu, Yanchun Zhang and Lin Li	Web Mining and SocialNetworking Techniques and applications	Springer	2011
4.	John Scott	Social Network Analysis	SAGE Publications Ltd	2013
5.	Toby Segaran	Programming Collective Intelligence	O□Reilly	2012

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Course Name	:	19CYE24&GAME PROGRAMMING	L	T	P	C
			3	0	0	3

Course Objectives

1.	Understand the concepts of Game design and development.
2.	Learn the processes, mechanics and issues in Game Design.
3.	Be exposed to the Core architectures of Game Programming.
4.	Know about Game programming platforms, frame works and engines.
5.	Learn to develop games

Course Outcomes

1.	Understand the concepts of Game design and development.
2.	Learn the processes, mechanics and issues in Game Design.
3.	Be exposed to the Core architectures of Game Programming.
4.	Know about Game programming platforms, frame works and engines.
5.	Learn to develop games.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE24.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE24.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE24.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE24.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE24.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :3D GRAPHICS FOR GAME PROGRAMMING	9
Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation	
Unit-II : GAME DESIGN PRINCIPLES	**9**
Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding	
Unit-III : GAMING ENGINE DESIGN	**9**
Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics	
Unit-IV : GAMING PLATFORMS AND FRAMEWORKS	**9**
Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio, Unity	
Unit-V : GAME DEVELOPMENT	**9**
Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.	
Total : 45	

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	David H. Eberly	Game Engine Design, Second Edition: A Practical Approach to Real Time Computer Graphics	"3D" Morgan Kaufmann, 2 Edition	2006

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Ernest Adams and Andrew.Rollings	Fundamentals of Game Design	Prentice Hall 1st edition	2006
2.	Roger E. Pedersen	Game Design Foundations	Edition 2, Jones & Bartlett Learning	2006

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Course Name	:	19CYE25&NATURAL LANGUAGE PROCESSING	L	T	P	C
			3	0	0	3

Course Objectives

1.	To tag a given text with basic language processingfeatures,
2.	To Design An innovative application using NLPcomponents,
3.	To implement a rule based system to tackle morphology/syntax of alanguage,
4.	To Design a tag set to be used for statistical processing keeping an application inmind,
5.	To Compare and contrast use of different statistical approaches for different types ofapplications.

Course Outcomes

1.	Understand the basic concepts of Natural LanguageProcessing.
2.	Describe the tag a given text with basic language processingfeatures,
3.	Implement a rule based system to tackle morphology/syntax of alanguage
4.	Design a tag set to be used for statistical processing keeping an application inmind
5.	To Compare and contrast use of different statistical approaches for different types ofapplications.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE25.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE25.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE25.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE25.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE25.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : INTRODUCTION — 9

Natural Language Processing tasks in syntax, semantics, and pragmatics – Issues - Applications - The role of machine learning - Probability Basics –Information theory – Collocations -N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.

Unit-II :MORPHOLOGY AND PART OFSPEECHTAGGING — 9

Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields.

Unit-III :SYNTAXPARSING — 9

Syntax Parsing - Grammar formalisms and treebanks - Parsing with Context Free Grammars - Features and Unification - Statistical parsing and probabilistic CFGs (PCFGs)-Lexicalized PCFGs

Unit-IV :SEMANTIC ANALYSIS — 9

Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation - Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

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Unit-V :APPLICATIONS			9
Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) – Basic issues in MT-Statistical translation-word alignment- phrase-based translation –Question AnswerinG.			
	Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Roland R. Hausser	Foundations of Computational Linguistics:	MIT Press	2011
2.	Daniel Jurafsky and James H. Martin	Martin Speech and Language Processing	McGraw Hill	2008

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Christopher D. Manning and Hinrich Schuetze	Foundations of Statistical Natural Language Processing	MIT Press	1999
2.	Steven Bird, Ewan Klein and Edward Loper	Natural Language Processing with Python	O'Reilly Media	2009
3.	Pierre M. Nugues	An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special	Soft cover reprint	2010
4.	James Allen,	Natural Language Understanding	Addison Wesley	1994
5.	Nitin Indurkhya, Fred J. Damerau	Handbook of Natural Language Processing	CRC Press	2010

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Course Name	:	19CYE26&BIG DATA ANALYTICS	L	T	P	C
			3	0	0	3

Course Objectives

1.	To Learn tips and tricks for BigData.
2.	To Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop
3.	To Learn the HadoopArchitecture
4.	To apply Hadoop ecosystemcomponents
5.	To Learn to build Hadoop Advanced Data baseSystems

Course Outcomes

1.	Understand the basic concepts of BigData.
2.	Explain the basics ofHadoop.
3.	Describe the architecture ofHadoop.
4.	Design Hadoop Ecosystem andyarn.
5.	Explain the techniques of HIVE AND HIVEQL,HBASE

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE26.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE26.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE26.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE26.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE26.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : INTRODUCTION TOBIGDATA — 9

Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

Unit-II :INTRODUCTIONHADOOP — 9

Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - DataSerialization.

Unit-III :HADOOPARCHITECTURE — 9

Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

Unit-IV :HADOOP ECOSYSTEMANDYARN — 9

Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

Unit-V :HIVE ANDHIVEQL, HBASE — 9

Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts- Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications withZookeeper

Total : 45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Boris lublinsky, Kevin t. Smith, Alexey Yakubovich	Professional Hadoop Solutions	Wiley	2015
2.	Chris Eaton, Dirk deroos	Understanding Big data	McGraw Hill	2012

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Tom White	HADOOP: The definitive Guide Everything	O Reilly	2012
2.	Vignesh Prajapati	Big Data Analytics with R and Haoop	Packet Publishing	2013
3.	Tom Plunkett, Brian Macdonald	Oracle Big Data Handbook	Oracle Press	2014
4.	Jy Liebowitz,	Jy Liebowitz,	CRC press	2013
5.	Seema Acharya and Subhashini C	Big Data and Analytics	Wiley India	2015

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Course Name	:	19CYE27&AD-HOC AND SENSOR NETWORKS	L	T	P	C
			3	0	0	3

Course Objectives

1.	To Understand the design issues in ad hoc and sensor networks
2.	To learn the different types of MAC protocols.
3.	Be familiar with different types of adhoc routing protocols.
4.	Be expose to the TCP issues in adhoc networks.
5.	To Learn the architecture and protocols of wireless sensor network

Course Outcomes

1.	Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks.
2.	Analyze the protocol design issues of ad hoc and sensor networks
3.	Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
4.	Evaluate the QoS related performance measurements of ad hoc and sensor networks.
5.	Explain the techniques of protocols networks

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE27.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE27.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE27.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE27.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE27.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : INTRODUCTION — 9

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs): concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

Unit-II : MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS — 9

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.1

Unit-III : ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS — 9

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

Unit-IV : WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS — 9

Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

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Unit-V : WSN ROUTING, LOCALIZATION & QOS			9
Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.			
	Total	:	45

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	C. Siva Ram Murthy, and B. S. Manoj	Ad Hoc Wireless Networks: Architectures and Protocols	Prentice Hall Professional Technical Reference	2008

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Carlos De Morais Cordeiro, Dharma Prakash Agrawa	Ad Hoc & Sensor Networks: Theory and Applications	World Scientific Publishing Company	2006.
2.	Feng Zhao and Leonides Guibas	Wireless Sensor Networks	Elsevier Publication	2002.
3.	Holger Karl and Andreas Willig	Protocols and Architectures for Wireless Sensor Networks	Wiley	2005

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Course Name	:	19CYE28&MANAGEMENT INFORMATION SYSTEM	L	T	P	C
			3	0	0	3

Course Objectives

1.	To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve businessproblems.
2.	To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniquesused.
3.	To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business morecompetitive.
4.	To enable the students to use information to assess the impact of the Internet and Internet technologyonelectroniccommerceandelectronicbusinessandunderstandthespecificthreats and vulnerabilities of computersystems.
5.	To provide the theoretical models used in database management systems to answer business questions.

Course Outcomes

1.	Relate the basic concepts and technologies used in the field of management information systems;
2.	Compare the processes of developing and implementing informationsystems.
3.	Outline the role of the ethical, social, and security issues of informationsystems.
4.	Translatetheroleofinformationsystemsinorganizations,thestrategicmanagementprocesses, with the implications for themanagement.
5.	Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of anorganization.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE28.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE28.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE28.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE28.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE28.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : Management information system in a digital firm	9
MIS concept - Definition –Role of the MIS - Impact of the MIS-MIS and the user - Management as a control system - MIS a support to management - Development process of theMIS	
Unit-II : System analysis and design	9
System - Need for system analysis - System analysis of the existing system - System analysis of a new requirements - System Development Model - Structured System Analysis and Design - Object Oriented Analysis	
Unit-III : Information system applications	9
MIS applications, DSS – GDSS - DSS applications in E enterprise - Knowledge Management System and Knowledge Based ExpertSystem- Enterprise Model System and E-Business, E- Commerce, E-communication, Business ProcessReengineering.	

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Unit-IV : Technology of information system		**9**
Data process- Transaction and application process- Information system process; Unified communication and network; Security challengesin E-enterprises; Security threats and vulnerability-Controlling security threat and vulnerability.		
Unit-V : Data base management system		**9**
Objectives of data base approach- Characters of databaseManagementsystems-Dataprocessingsystem-ComponentsofDBMSpackages- Data base administration- Data models - Datawarehouse.		
Total	**:**	**45**

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jawadekar, W.S	Management Information Systems	Tata McGrawHill Private Limited	2009
2.	Kenneth C. Laudon and Jane P. Laudon	Management Information Systems	Pearson Education	-
3.	Alex Leon and Mathew Leon	Data Base Management Systems	Vikas Publishing House	-
4.	Goyal, D.P	Management Information System	MACMILLAN India Limited	2008
5.	Panneerselvam R	Database Management System	PHI Private Limited	2008

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Course Name	:	19CYE29&SOFTWARE QUALITY ASSURANCE	L	T	P	C
			3	0	0	3

Course Objectives

1.	Understand the basic tenets of software quality and quality factors.
2.	Be exposed to the Software Quality Assurance (SQA) architecture and the details of SQA components.
3.	Understand of how the SQA components can be integrated into the project life cycle.
4.	Be familiar with the software quality infrastructure.
5.	Be exposed to the management components of software quality.

Course Outcomes

1.	Utilize the concepts in software development life cycle.
2.	Demonstrate their capability to adopt quality standards.
3.	Assess the quality of software product.
4.	Apply the concepts in preparing the quality plan & documents.
5.	Demonstrate testing a software and apply management principles on decision making

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE29.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE29.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE29.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE29.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE29.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :Software Quality — 9

Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity Relationship, Requirements of a Product, Organisation Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, and Important Aspects of Quality Management.

Unit-II : Fundamentals of testing — 9

Introduction, Necessity of testing, what is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing, Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Workbench, Important Features of Testing Process, Misconceptions About Testing, Principles of Software Testing, Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency, Mutation Testing, Challenges in Testing.

Unit-III : Testing Strategies: Unit Testing- Boundary Value Testing — 9

Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing-**Equivalence Class Testing:** Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations- **Decision Table–Based Testing:** Decision Tables, Decision Table Techniques, Cause-and-Effect Graphing, Guidelines and Observations- **Path Testing:** Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing, Guidelines and Observations- **Data Flow Testing:** Define/Use Testing, Slice-Based Testing, Program Slicing Tools.

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Unit-IV : Software Verification and Validation	9
Introduction, Verification, Verification Workbench, Methods of Verification, Types of reviews on the basis od Stage Phase, Entities involved in verification, Reviews in testing lifecycle, Coverage in Verification, Concerns of Verification, Validation, Validation Workbench, Levels of Validation, Coverage in Validation, Acceptance Testing, Management of Verification and Validation, Software development verification and validation activities. V-test Model: Introduction, V-model for software, Testing during Proposal stage, Testing during requirement stage, Testing during test planning phase, Testing during design phase, Testing during coding, VV Model, Critical Roles and Responsibilities. **Levels of Testing:** Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing & Critical Path First.	
Unit-V : Special Tests	**9**
Introduction, GUI testing, Compatibility Testing, Security Testing, Performance Testing, Volume Testing, Stress Testing, Recovery Testing, Installation Testing, Requirement Testing, Regression Testing, Error Handling Testing, Manual Support Testing, Intersystem Testing, Control Testing, Smoke Testing, Adhoc Testing, Parallel Testing, Execution Testing, Operations Testing, Compliance Testing, Usability Testing, Decision Table Testing, Documentation Testing, Training testing, Rapid Testing, Control flow graph, Generating tests on the basis of Combinatorial Designs, State Graph, Risk Associated with New Technologies, Process maturity level of Technology, Testing Adequacy of Control in New technology usage, Object Oriented Application Testing, Testing of Internal Controls, COTS Testing, Client Server Testing, Web Application Testing, Mobile Application Testing, eBusiness eCommerce Testing, Agile Development Testing, Data Warehousing Testing.	
Total : 45	

REFRENCE BOOKS :

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	William E. Lewis	Software Testing and Continuous Quality Improvement	CRC Press	2016
2.	M. G. Limaye	Software Testing: Principles, Techniques and Tools	TCH	2017
3.	Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black	Foundations of Software Testing	Cengage Learning	-
4.	Paul C. Jorgenson	Software Testing: A Craftsman's Approach	CRC Press	2017

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Course Name	:	19CYE30&BIOINFORMATICS	L	T	P	C
			0	0	0	0

Course Objectives

1.	To improve the programming skills of the student
2.	To let the students know the recent evolution in biological science.
3.	To learn about Phylogenetics and its applications
4.	To know about inference problems in biology and its applications
5.	To learn how to perform RNA modeling

Course Outcomes

1.	Develop bioinformatics tools with programming skills.
2.	Apply computational based solutions for biological perspectives.
3.	To understand phylogenetics and its applications
4.	To apply engineering techniques in the field of molecular biology
5.	To create RNA models using various algorithms

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE30.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE30.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE30.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE30.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE30.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :INTRODUCTION — 9

Introduction to Operating systems, Linux commands, File transfer protocols ftp and telnet, Introduction to Bioinformatics and Computational Biology, Biological sequences, Biological databases, Genome specific databases, Data file formats, Data life cycle, Database management system models, Basics of Structured Query Language (SQL).

Unit-II :SEQUENCE ANALYSIS — 9

Sequence Analysis, Pair-wise alignment, Dynamic programming algorithms for computing edit distance, string similarity, shotgun DNA sequencing, end space free alignment. Multiple sequence alignment, Algorithms for Multiple sequence alignment, Generating motifs and profiles, Local and Global alignment, Needleman and Wunsch algorithm, Smith Waterman algorithm, BLAST, PSIBLAST and PHIBLAST algorithms.

Unit-III :PHYLOGENETICS — 9

Introduction to phylogenetics, Distance based trees UPGMA trees, Molecular clock theory, Ultrametric trees, Parsimonious trees, Neighbour joining trees, trees based on morphological traits, Bootstrapping. Protein Secondary structure and tertiary structure prediction methods, Homology modeling, abinitio approaches, Threading, Critical Assessment of Structure Prediction, Structural genomics.

Unit-IV :MOLECULAR BIOLOGY — 9

Inference problems and techniques for molecular biology- Overview of key inference problems in biology: Homology identification, Genomic sequence annotation (Genes and ORFs identification), Protein structure prediction (Secondary and Tertiary structure prediction), Protein function prediction, Biological network identification, Next generation sequencing.

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Unit-V :RNA Modeling		9
Basics of RNA Structure prediction and its limitations, Features of RNA Secondary Structure,RNA structure predictionmethods: Based on self-complementary regions in RNA sequence, Minimum free energy methods, Suboptimal structure prediction by MFOLD, Prediction based on finding most probable structure and Sequence co-variance method. Application of RNA structure modeling.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Lesk, A. K.	Introduction to Bioinformatics	Oxford University Press	2013
2.	Dan Gusfield	Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology	Cambridge University Press	1997

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Durbin, R., Eddy, S., Krogh, A., and Mitchison, G.	Biological Sequence Analysis Probabilistic Models of proteins and nucleic acids	Cold Spring Harbor Laboratory Press	2004
2.	Baldi, P. and Brunak, S	Bioinformatics: The Machine Learning Approach	Cambridge University Press	1998

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Course Name	:	19CYE31&DOCKER AND KUBERNETES	L	T	P	C
			3	0	0	3

Course Objectives

1.	To Understand Kubernetes Architecture
2.	To Know the Principles of cluster And Image Management
3.	To Define Network And data Management using containers
4.	To Develop a Docker Essentials
5.	To deploy stateful and stateless apps on the cluster

Course Outcomes

1.	Installing & creating an account with docker Hub
2.	Develop interactive Scaling control and Networking Services using docker
3.	Expose the Build Comprehensive Hands-on with Kubernetes Components
4.	Kubernetes Cluster installation on Virtualbox, AWS & Google Cloud Platforms
5.	Develop interactive app outside the cluster and to autoscale apps

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE31.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE31.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE31.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE31.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE31.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : INTRODUCTION — 9

Introduction to Docker-requirements –Docker containers-listing-searching-pulling for an image-Starting containers-listing containers-stopping containers,deleting containers-setting and getting privileged access inside a container- run container images in Kubernetes-injecting new process to a running container-labelling filtering containers

Unit-II : NETWORK AND DATA MANAGEMENT FOR CONTAINERS — 9

Introduction-Accessing containers from outside-Managing data in containers-linking two or more containers-LAMP-application by linking containers-networking of multihost containers with Flannel-Assigning IPv6 addresses to containers.

Unit-III : DOCKER PERFORMANCE AND ORCHESTRATION — 9

Introduction-Benchmarking CPU performance,Benchmarking disk performance, Benchmarking network performance-Performance monitoring.Orchestration-Introduction-Applications with docker compose-cluster with docker Swarm-CoreOS for docker Orchestration-docker in project atomic.

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Unit-IV : INTRODUCTION TO KUBERNETES		9
Introduction- Kubernetes Architecture- Components of kubernetes cluster -cluster management - Deploy Kubernetes- deploy Kubernetes on AWS and Google cloud platforms- Pods and Deployments -Kubernetes Master- master nodes.		
Unit-V : KUBERNETES USING DOCKER		**9**
Kubernetes Management Design Patterns with Docker, CoreOS Linux- Kubernetes docker containers-Nodes-Cluster-Service-pod-Replication controller-label-selector-name-namespace-volume-Service proxy-listing service-listing nodes-Kubernetes Cluster-Scaling-Testing-wordpress with kubernetes cluster.		
	Total :	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepak Vohra	Kubernetes Microservices with Docker	Apress	2016
2.	Neependra Khare	Docker Cookbook	Packt Publishing	2015

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Deepak Vohra	Kubernetes Management Design Patterns	Apress	2017
2.	Ed Robinson	Kubernetes on AWS	Packt Publishing	2018
3.	Karl Matthias, Sean P. Kane	Docker: Up and Running	O'Reilly Media	2015

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Course Name	:	19CYE32&OPEN STACK ESSENTIALS	L	T	P	C
			3	0	0	3

Course Objectives

1.	To Understand Open Stack Architecture
2.	To Know The Principles Of Identity And Image Management
3.	To Define Network And Instance Management
4.	To Develop A Block And Object Storage
5.	To Design And Build Simple Nodes

Course Outcomes

1.	Installing Pack stack and generating an answer file
2.	Develop Glance as a Registry of images
3.	Build Web Interface External Network Setup
4.	Develop Object file management in the web interface
5.	Develop interactive Scaling control and Networking Services

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYE32.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE32.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE32.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE32.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE32.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I : ARCHITECTURE AND COMPONENT OVERVIEW — 9

Open Stack Architecture- Dashboard- Keystone- Glance- Neutron- Nova- Cinder-Shift- Ceilometer- Heat.RDO Installation: Installing RDO using Packstack -Installing Packstack and generating an answer file.

Unit-II : IDENTITY AND IMAGE MANAGEMENT — 9

Services and Endpoints: Hierarchy of users-roles-Creating an User-Creating an role-Interacting with Keystone in the dashboard-Endpoints in the Dashboard.Glance as a Registry of images -Using the Web Interface-Building an Image.

Unit-III : NETWORK AND INSTANCE MANAGEMENT — 9

Networking And Neutron-Network Fabric-Open VSwitch Configuration-VLAN –GRE tunnels-VXLAN tunnels- Creating a Network- Web interface Management-External Network access – Preparing a network – Creating an External network-Web Interface External Network Setup.Managing flavors –Managing key pairs – Launching an Instance-Managing floating IP addresses-Managing Security Groups.

Unit-IV : BLOCK AND OBJECT STORAGE — 9

Use case – Creating and using Block Storage – Attaching the block storage to an Instance - Backing Storage – Cinder types. Object Storage- Use case Architecture of Swift Cluster – Creating and using object storage – Object file management in the web interface – Ring Files.

Unit-V : SCALING AND MONITORING			9
Scaling Compute nodes – Control and Networking – Scaling control and Networking Services – Load – Balancing Key stone – Additional Key stone tuning – Glance Load Balancing.Monitoring – Methods – Commands – Non open stack Service checks – Monitoring control services – Network Services – Compute services – Trouble Shooting.			
	Total	:	45

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dan Radez	OpenStack Essentials Second Edition	Packt Publishing	2015
2.	Neependra Khare	Docker Cookbook	Packt Publishing	2013

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Omar Khedher	Learning Openstack Networking Third Edition	Packt Publishing	2014
2.	Cody Bumgardner	Open Stack in Action	Packt Publishing	2011
3.	Tom Fifield	Open stack Operations Guide	Packt Publishing	2000

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Course Name	:	19CYE33&USER CENTRIC DESIGN	L	T	P	C
			3	0	0	3

Course Objectives

1.	Given a problem setting, critically discuss the appropriateness of potential design methods such as contextual design, prototyping, ideation, etc.
2.	Describe the issues and challenges to achieving a human-centered design process.
3.	Gather useful information about users and activities through observation or systematic in quiry.
4.	Use, adapt and extend design standards, guidelines, and patterns.
5.	Create a prototype for a small system and plan and perform a usability evaluation.

Course Outcomes

1.	Develop an appreciation for the theory and sensibilities of user-centered design
2.	Develop skills in the use and application of a variety of design methods, specifically Applicable to user- centered design
3.	Improve individual and collaborative skills in design-based problem solving
4.	Develop UCD is an Iterative process
5.	Develop Multidisciplinary Design Teams for User Centered Design

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE33.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE33.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE33.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE33.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE33.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : USER CENTERED DESIGN OVERVIEW — 9

User centered Design- UCD Principle - Iterative Process-Phase of the design process—Investigative Methods and Tools-Example: Brainstorming- Apply User Centered Design – Understand context of use – Specify user Requirements – Design Solutions – Evaluate against requirements – Hardware UCD - Working with Users.

Unit-II : MULTIDISCIPLINARY DESIGN TEAMS — 9

Multidisciplinary Design Teams for User Centered Design: Engineer-Designer-Researcher- Marketer – Stakeholder – Investment in UCD Pays off – Benefits of User centered Design – Approach of User centered Design – UX and Interactive Design. Design Principle : Hick's Law – Fitt's Law – Visibility – Visual Feedback – Gestalt Principle – Mobile UCD – UCD Terms.

Unit-III : ESTABLISISHING A BASELINE ABOUT UCD — 9

Introduction to UCD – UCD and User Experience – User Experience versus User Interface – UX is more than a Buzz word – User Research – Interviews – Surveys – Focus Groups – Observational Usability Research – Scenarios - UCD Process – Storyboards - Creating a personal Manifesto – Balance and Filter Design Features – MVP .

Unit-IV : USER CENTRIC TOOLS AND TECHNIQUES — 9

Introduction to UCD Tools and Techniques – Activity: Personas and Target Audience – UX One sheet – Journey Mapping – Wire framing – Ideation –Prototyping – Evaluation – Design specification - Sketching: Open ended vs Highly Constrained Sketching – Scribble Sketching – Stretch your imagination – Combining Sketching with images – Final Reflection – Pendo – Survey Monkey- Axure – POP - Silverback.

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Unit-V : TRENDS IN UCD		9
Personalization - Material design - Designing for content - Designing for content - Animation and micro-interactions - Accessible design - AI for testing design options and making decisions - Data and design collaboration - Minimalistic Simple Designs - Stellar 3D Animation & Graphic – RIDE (Report – Iterate Deploy – Evaluate).		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Travis Lowdermilk	User-Centered Design: A Developer's Guide to First Edition	O'Reilly Media	2013
2.	Brian Still and Kate Cran	Fundamentals of User-Centered Design: A Prac	CRC Press	2016

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Elizabeth F. Churchill,	Foundations for Designing User-Centered Systems: What System Designers Need to Know about People	Springer	2014
2.	Amir Shevat		O'Reilly Media	2017
3.	Westley Knight	UX for Developers: How to Integrate User-Centered Design Principles Into Your Day-to-Day Development Work	Apress	2018

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Course Name	:	19CYE34&SOFTWARE TESTING	L	T	P	C
			3	0	0	3

Course Objectives

1.	To understand the basic software testingprinciples.
2.	To understand the working principles of various testingmethodologies.
3.	ToUnderstandknowledgeoftechniquesforsystemtestingandfunctionaltesting
4.	Tounderstandthewaysandmeansofcontrollingand monitoringtestingactivity.
5.	To understand the concept of modern software testingtools.

Course Outcomes

1.	Explain the basic software testingprinciples.
2.	Classify the types oftesting
3.	Differentiate operation of system testing & functionaltesting
4.	Analyze the techniques in testing in planning, automation & executionmanagement.
5.	Implement the testing using modern software testingtools.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE34.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE34.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE34.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE34.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE34.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :INTRODUCTION — 9

Basic Concepts and preliminaries –Objectives of Testing-Testing Activities-Testing Levels-Role of Testing-Verification and Validation-Test Case-Theory of Program Testing- Theory of Good enough and Gerhart- Weyuker and Ostrand- Gourlay- Adequacy of Testing- Limitations of Testing.

Unit-II :TYPES OF TESTING — 9

Unit Testing-Static and Dynamic Unit Testing-Defect Prevention-Mutation Testing and Debugging-Control Flow Testing-Control Flow Graph- Paths in a Control Flow Graph- Path Selection Criteria- Generating Test Input- Data Flow Testing-Data Flow Graph- Data Flow Terms- Data Flow Testing Criteria- Comparison of Data Flow Test Selection Criteria-Feasible Paths and Test Selection Criteria- Comparison of Testing Techniques-Domain Testing.

Unit-III :SYSTEM TESTING & FUNCTIONAL TESTING — 9

System Testing- Different Types of Interfaces and Interface Errors- System Integration Techniques- Software and Hardware Integration- Test Plan for System Integration- Test Categories- Basic Tests- Functionality Tests- Robustness Tests- Functional Testing- Functional Testing Concepts of Howden- Pairwise Testing- Equivalence Class Partitioning-Boundary Value Analysis- Decision Tables- Random Testing- Error Guessing- CategoryPartition

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Unit-IV :PLANNING, AUTOMATION & EXECUTION	9
Planning And Automation- Approach- Suite Structure- Environment- Execution Strategy- Effort Estimation- System Test Automation- Evaluation and Selection of Test Automation Tools- Characteristics of Automated Test Cases- Structure of an Automated Test Case- Test Execution- Modeling Defects- Metrics for Tracking System Test- Orthogonal Defect Classification- Defect Causal Analysis- Beta Testing- First Customer Shipment- System Test Report- Product Sustaining- Measuring TestEffectiveness	
Unit-V : MODERN SOFTWARE TESTING TOOLS	**9**
. Evolution of Automated Testing Tools-Variable Capture/Replay Tools-Extreme Programming-Software Testing Trends-Taxonomyof Testing Tools-Methodologyto Evaluate Automated Testing Tools-Case Study	
Total : 45	

TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kshirsagar Naik, Priyadarshi Tripathy	Software Testing & Quality Assurance	A JOHN WILEY & SONS	2011
2.	William E.Lewis, Gunasekaran Veerapillai	Software Testing & Continuous Quality Improvement	AUERBACH PUBLICATIONS	2011

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alan C Gillies	Software Quality Theory and Management	Cengage Learning	2011
2.	Srinivasan Desikan, Gopalaswamy Ramesh	Software Testing – Principles and Practices	Pearson Education	2009.
3.	Ron Patton	Software testing	Pearson Education	2007
4.	William E. Perry	Effective Methods for Software Testing	Wiley India	2006.
5.	Renu Rajani and Pradeep Oak	Software Testing – Effective Methods, Tools and Techniques	TataMcGraw Hill PublishingCompany Limited	2005

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Course Name	:	19CYE35&SOFT COMPUTING	L	T	P	C
			0	0	0	0

Course Objectives

1.	To understand the basic concepts of softcomputing
2.	Tounderstandthefundamentalsofartificialandneuralnetworks
3.	To understand the fundamentals Unsupervised LearningNetwork
4.	Tounderstandthefuzzysetsandfuzzylogicandgeneticalgorithms.
5.	To understand the fuzzy Fuzzy Arithmetic and FuzzyMeasures

Course Outcomes

1.	Build intelligent machines using softcomputing techniques.
2.	Design a Neural Networks for the real timeproblems.
3.	Implement various learningtechniques
4.	ApplyfuzzylogicandDevelopfuzzysetsforrealtimeproblems.
5.	Develop genetic algorithms for various realtime applications

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE35.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE35.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE35.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE35.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE35.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :AI PROBLEMSANDSEARCH

AI problems, Techniques, Problem Spaces and Search, Heuristic Search Techniques- Generate and Test, Hill Climbing, Best First Search Problem reduction, Constraint Satisfaction and Means End Analysis. Approaches to Knowledge Representation- Using Predicate Logic 2nd Rules.

Unit-II : ARTIFICIALNEURALNETWORKS

Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perception Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks, Training Algorithms for pattern association, BAM and Hopfield Networks.

Unit-III :UNSUPERVISEDLEARNINGNETWORK

Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks- Introduction to various i networks.

Unit-IV :FUZZYLOGIC

Introduction to Classical Sets (crisp Sets)and Fuzzy Sets- operations and Fuzzy sets. Classical Relations -and Fuzzy Relations- Cardinality, Operations, Properties and composition. Tolerance and equivalencerelations. Membership functions- Features, Fuzzification, membership value assignments, Defuzzification.

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Unit-V :APPLICATIONS		9
Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule Base and Approximate Reasoning Fuzzy Decision making Fuzzy Logic Control Systems. Genetic Algorithm- Introduction and basic operators andterminology. Applications: Optimization of TSP, Internet Search technique.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S N Sivanandam, S N Deepa	Principles of Soft Computing	Wiley India	2007
2.	Fakhreddine 0 Karray, Clarence D Silva	Soft Computing and Intelligent System Design	Pearson Edition	2004

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Amit Konar	Artificial Intelligence and Soft Computing- Behavioral and Cognitive Modeling of the Human Brain	CRC press	2000
2.	Elaine Rich and Kevin Knight	Artificial Intelligence	TMH	2008
3.	Stuart J. Russell and Peter Norvig	Artificial Intelligence A Modern Approach	Prentice Hall	2010
4.	Hung T. Nguyen, Elbert A. Walker	A first course in Fuzzy Logic	CRC. Press	2005
5.	N. P. Padhy	Artificial Intelligence and Intelligent Systems	Oxford University Press	2005

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Course Name	:	19CYE36&REALTIMESYSTEMS	L	T	P	C
			3	0	0	3

Course Objectives

1.	Tounderstandthebasicconceptsofreal-timecomputing
2.	Tounderstandthemajorissuesreal-timeschedulingandreal-timekernels.To writeReal-timescheduling algorithms
3.	To understand timing analysis and resource control inrealtimesystem
4.	To design the real time database and faulttoleranttechniques
5.	To implementation the real-timeoperating systems.

Course Outcomes

1.	Applytheknowledgeofoperatingsystemconceptstounderstandrealtimesystem.
2.	Implement the tasks scheduling of Realtime systems
3.	Define various protocols for effective resourcesharing
4.	Findoutthefault inrealtimesystembyusingvarioustechniques
5.	Design real time system for various realtime applications

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE36.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE36.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE36.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE36.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE36.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I : INTRODUCTION TO REALTIMESYSTEM — 9

Typical RT applications - Hard and soft Real Time constraints - Hard and soft RTS - Reference Modeling RTS- Issues in RTS - Structure of RTS

Unit-II :REALTIMESCHEDULING — 9

Task, processes, processors - Task allocation algorithm - Single processor and multi processor Scheduling - Clock driven and priority based scheduling algorithm

Unit-III :TIMING ANALYSIS ANDRESOURCECONTROL — 9

Prediction of Execution Time - Worst Case Execution Time (WCET) analysis – Assumptions on Resources and Their Usage – Resource Contention and Resource Access Control – Priority Ceiling Protocol – Priority Inheritance Protocol – Stack Based Priority Ceiling Protocol – Preemption Ceiling Protocol.

Unit-IV :REALTIMEDATABASEANDFAULTTOLERANTTECHNIQUES — 9

Transaction priority and concurrency control issues - Disk scheduling - Fault type and Detection Techniques - Redundancy management – Integration issues

Unit-V :REAL TIME SYSTEMCASESTUDIES — 9

Examples of Hard, Soft and Firm real time systems like automatic chocolate vending machine, Smart Card and Adaptive Cruise Control System in a car or flight

Total : 45

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Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jane .W. S. Liu	Real Time Systems	Pearson Education	2012
2.	Krishna .C.M	Real Time Systems	Mc-Graw Hill	2010

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Prasad K.V.K.K	Embedded/Real-Time Systems: Concepts, Design and Programming Cognitive Modeling of the Human Brain	Dream Tech Press	2014
2.	Sriram V Iyer , Pankaj Gupta	Embedded Real Time Systems Programming	McGraw Hill	2010
3.	Phillip A. Laplante	Real-Time Systems Design & Analysis	John Wiley & Sons	2006

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Course Name	:	19CYE37&MACHINE LEARNING	L	T	P	C
			3	0	0	3

Course Objectives

1.	To learn about learning systems
2.	To understand Decision Tree Learning and Ensemble Learning
3.	To understand Computational Learning Theory
4.	To understand ANN
5.	To differentiate Supervised and Unsupervised learning

Course Outcomes

1.	Knowledge about learning systems
2.	Differentiate Decision tree and ensemble learning
3.	Analyze the performance of various learning systems.
4.	Design an learning system
5.	Distinguish Supervised and Unsupervised learning

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO 3
19CYE37.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE37.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE37.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE37.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYE37.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Unit-I :Introduction.	9

Definition of learning systems- Goals and applications of machine learning- Aspects of developing a learning system: training data, concept representation and function approximation- Inductive Classification- Version spaces and the candidate elimination algorithm- Learning conjunctive concepts.

Unit-II : Decision Tree Learning and Ensemble Learning	9

Representing concepts as decision trees- Recursive induction of decision trees- Picking the best splitting attribute: entropy and information gain- Searching for simple trees and computational complexity- Occam's razor- Overfitting, noisy data, and pruning- Ensemble Learning- Active learning with ensembles- Measuring the accuracy of learned hypotheses- Comparing learning algorithms: cross-validation- learning curves and statistical hypothesis testing.

Unit-III : Computational Learning Theory	9

Models of learn ability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity: quantifying the number of examples needed to PAC learn. Computational complexity of training. Sample complexity for finite hypothesis spaces. PAC results for learning conjunctions, kDNF, and kCNF. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension

Unit-IV : Artificial Neural Networks	9

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Neurons and biological motivation. Linear threshold units. Perceptrons: representational limitation and gradient descent training. Multilayer networks and backpropagation. Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks.		
Unit-V : Clustering and Unsupervised Learning		**9**
Learning from unclassified data. Clustering. Hierarchical Aglomerative Clustering. k-means partitional clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabled data.		
Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Tom Mitchell	Machine Learning	Tata Mc Grill	1997

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Oliver Theobald	Machine Learning for Absolute Beginners	-	2017
2.	Peter Flach	Machine Learning: A Probabilistic Perspective	-	2018
3.	Kevin P. Murphy	Machine Learning: The Art and Science of Algorithms that Make Sense of Data	-	2019

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Course Name	:	19CYE38&HIGH SPEED NETWORKS	L	T	P	C
			3	0	0	3

Course Objectives

1.	To learn High speed networks and ATMArchitecture
2.	To understand resource allocation and s congestionmanagement approaches
3.	To understand resource allocation and s congestionmanagement approaches
4.	To understand the integrated and differentiatedservices
5.	To learn protocols forQOS support

Course Outcomes

1.	Summarizethemechanismstoprovidehighspeednetworkingthroughcasestudiesof ATMandframe relaynetworks
2.	Construct queuing system with different arrival andservice rates
3.	Analyze the performance of various congestion controls inATM.
4.	Design the integrated and differentiatedservices
5.	Explain the protocols needed for QoSsupport.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE38.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE38.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE38.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE38.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE38.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :HIGHPERFORMANCENETWORKS — 9

FrameRelayNetworks–AsynchronousTransferMode(ATM)–ATMProtocolArchitecture-ATMlogical connection - ATM cell – ATM service categories – ATM Adaptation Layer (AAL) - High Speed LANs: Fast ethernet - Gigabit ethernet - Fiberchannel.

Unit-II : QUEUINGMODELS ANDCONGESTIONMANAGEMENT — 9

Queuing analysis- Queuing models – Single server queues – Effects of congestion – Congestion control – Traffic management – Congestion control in packet switching networks

Unit-III : ATMCONGESTIONCONTROL — 9

Performance of TCP over ATM - Traffic and congestion control in ATM – Requirements – Attributes – Traffic management frame work - Traffic control – Available Bit Rate (ABR) Traffic management – ABR rate control - Resource Management (RM) Cell formats – ABR capacity allocations.

Unit-IV : INTEGRATED ANDDIFFERENTIATEDSERVICES — 9

Integrated services architecture – Approach - Components - Services - Queuing discipline – Fair admission control - Traffic shaping - Resource reservation queuing (FQ) - Processor Sharing (PS) - Bit-Round Fair Queuing (BRFQ) - Generalized Processor Sharing (GPS) - Weighted Fair Queuing (WFQ) – Random early detection - Differentiated services DS code points – Per Hop Behavior

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Unit-V : PROTOCOLS FORQOSSUPPORT			9
Resource Reservation (RSVP) – Goals & characteristics - Data flow - RSVP operations - Protocol mechanisms – Multiprotocol label switching – Operations - Label stacking – Protocol details – Real Time Protocol (RTP) – Protocol architecture - Data transfer protocol - Real Time Control Protocol (RTCP)			
	Total	**:**	**45**

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	William Stallings	High Speed Networks and	Pearson Education	2002
2	Warland &PravinVaraiya	High Performance Communication Networks	Jean Harcourt Asia Pvt. Ltd	2001

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	IrvanPepelnjk, et al	MPLS and VPN architecture□	Cisco Press	2003
2.	Behrouz A. Forouzan, Sophia Chung Fegan	Data Communications and Networking	McGraw-Hill Higher Education	2003

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Course Name	:	19CYE38&HIGH SPEED NETWORKS	L	T	P	C
			3	0	0	3

Course Objectives

6.	To learn High speed networks and ATMArchitecture
7.	To understand resource allocation and s congestionmanagement approaches
8.	To understand resource allocation and s congestionmanagement approaches
9.	To understand the integrated and differentiatedservices
10.	To learn protocols forQOS support

Course Outcomes

6.	Summarizethemechanismstoprovidehighspeednetworkingthroughcasestudiesof ATMandframe relaynetworks
7.	Construct queuing system with different arrival andservice rates
8.	Analyze the performance of various congestion controls inATM.
9.	Design the integrated and differentiatedservices
10.	Explain the protocols needed for QoSsupport.

Course Outcomes	Program Outcomes												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2	PSO 3
19CYE38.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE38.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE38.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE38.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYE38.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Unit-I :HIGHPERFORMANCENETWORKS — 9

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Unit-V : PROTOCOLS FORQOSSUPPORT			9
Resource Reservation (RSVP) – Goals & characteristics - Data flow - RSVP operations - Protocol mechanisms – Multiprotocol label switching – Operations - Label stacking – Protocol details – Real Time Protocol (RTP) – Protocol architecture - Data transfer protocol - Real Time Control Protocol (RTCP)			
	Total	:	45

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2	Warland &PravinVaraiya	High Performance Communication Networks	Jean Harcourt Asia Pvt. Ltd	2001

Reference Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
3.	IrvanPepelnjk, et al	MPLS and VPN architecture□	Cisco Press	2003
4.	Behrouz A. Forouzan, Sophia Chung Fegan	Data Communications and Networking	McGraw-Hill Higher Education	2003

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EMPLOYABILITY ENHANCEMENT COURSES (EEC)

19CYP01	PROJECT WORKPHASEI	L T PC 0 0105

COURSE OBJECTIVES

1. Topracticalimplementationoftheoreticalknowledgegainedduringthestudyfrom FirstyeartoThird year
2. Toimplementtheirideas/realtimeindustrialproblem/currentapplicationoftheirengineeringbranch which they have studied incurriculum
3. To build confidence in the student what he has learnttheoretically.
4. T o identify the appropriate problem solvingmethodology
5. T o Analyze and process the experimentalinformation

COURSE OUTCOMES

1. Prepare a literaturesurveyinaspecificdomainasateam/individualtomotivatelifelonglearning.
2. Identifytheproblemwhichneedstobeprovidedasustainablesolutionusingmoderntools
3. Analyzetheproblemdefinitionanddesignitsimpactonthesocietyandenvironment.
4. Document the literature andbindings.
5. ChosethedomainofInformationTechnologyandprogramminglanguagesandapplytovarietyofreal time problemscenarios.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYP01.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP01.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP01.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP01.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP01.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

Content:

- Projecthelpedstudentstogather,organize,summarizeandinterprettechnicalliterature withthe purpose of formulating a projectproposal.

- B.E. Projects can be two types: Projects based on implementation of anyapplicationoriented
- problem,whichwillbemoreorlessexperimentalinnature,andtheotherswillbebasedon some innovative/ theoreticalwork.

- InProjectPhase-Ithestudentwillundertakeprojectovertheacademicyear,whichwillinvolve the analysis, design of a system or sub system in the area identified earlier in the field of InformationTechnology.
- The topic must be formulated in consultation with the guide and projectcoordinator.

- Theprojectwillbeundertaken preferablybyagroupof1-3students who willjointlywork and implement theproject.
- Thegroupwill selectaproject withapprovalfromacommitteeformedbythedepartmentof seniorfacultytocheckthefeasibilityandapprovethetopic.

Review Committee:

- The Head of the department/Project coordinator shall constitute a reviewcommittee for project work for projectgroup.
- Project guide would be one member of that committee bydefault.
- Thestudentsorprojectgroup shallmakepresentationontheprogressmadebythembefore thecommittee.
- Therecordofthereviewcommitteeshouldbeproperlymaintained and should be made available at the timeofexamination.
- Eachstudent/groupisrequiredtogivepresentationaspartofreviewfor 10to15 minutesfollowedby a detaileddiscussion.

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PROJECT WORK REVIEWS

- Projectworkphaseswillhaveaminimumofthreeinternalreviewsbyanappointedcommitteeoffaculty.
- The final review will be done byan external faculty

Review 1: Finalization of scope – the objectives and scope of the project should be finalized in second week of their academic semester. Should finalize list of required hardware, software or other equipment for executing the project, test environment/tools.
Review 2: Finalization – High level design, planning.**Guidelines for Students and Faculty: Project Review Committee:**

1. Thiscommitteewillberesponsibleforevaluatingthetimelyprogressoftheprojectsandcommunicating the progress report to thestudents.
2. As far as possible Students should finalize the same project titletaken forProject.
3. Reviewcommitteeshouldconduct"FeasibilityReview"infirstweekaftercommencementoftheterm.Review committee should finalize the scope of theproject.
4. Ifchangeinprojecttopicisunavoidablethenthestudentsshouldcompletetheprocessofprojectapproval bysubmittingsynopsisalongwiththereviewofimportantpapers.Thisnewprojecttopicshouldbe approved by reviewcommittee.

Term Work:

1. Thetermworkwillconsistofareportpreparedbythe studentontheprojectallotted tothem.
2. Theyshoulduseappropriatetoolsforthepreparationofthereportlikeprojectplanning,UMLdiagram, testing tools, referencing toolsetc.

Report Structure

- Contents
- List ofAbbreviations
- List ofFigures
- List ofGraphs
- List ofTables

1. Introduction and aims/motivation andobjectives
2. LiteratureSurvey
3. ProblemStatement
4. ProjectRequirements
5. SystemAnalysisProposedArchitecture/highleveldesignoftheproject
6. VerificationValidation
7. Projectplan
8. Conclusion
9. References
10. Appendices

Evaluation Guidelines:

- Apanel ofexaminerwillevaluatethe viabilityofproject/projectscope.
- The panel will also verify that all the suggestions/comments in the review document are taken care and accordingly allot the termworkmarks.
- Oral examination in the form of presentation will be based on the project work completedby thecandidates.Preliminaryreportmustalsobepresentedduringtheoralexamination.

TOTAL HOURS: 150

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19CYP02 **PROJECT WORK -PHASEII** **L T PC**
0 0 20 10

COURSE OBJECTIVES

1. To Plan an experimental design to solve Engineeringproblems
2. Todevelopanattitudeofteamworkandindependent workingonrealtimeproblems
3. To Analyze and process theexperimentalinformation
4. To evaluate, interpret and justifythe experimental results
5. To develop a dissertationreport

COURSE OUTCOMES

1. Plananexperimentaldesigntosolveengineering/societalproblems usingmoderntools
2. Developlifelonglearningtokeepabreastoflatesttechnologies.
3. Analyzeandimplementthedesigntoprovidesustainablesolutions.
4. Evaluateandinterprettheexperimentalresultsandanalyzetheimpactonsocietyand environment.
5. Implementandtesttheapplicationfor therealtimeproblems.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYP02.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP02.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP02.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP02.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP02.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

PROJECT WORK REVIEWS

- Projectworkphaseswillhaveaminimumofthreeinternalreviewsbyanappointedcommitteeof faculty.
- The final review will be done byan external faculty

Review 3: Implementation Status and testing document.
Review 4: Final Project Demonstration, Project Report and proper Result analysis

The group will submit at the end of semester II.

a. The Workableproject.
b. Projectreport(WordDocument)intheformofboundjournalcompleteinallrespect– 1 copyfortheInstitute,1 copyforguideand1copyofeach studentinthegroupfor certification. The project report contains the details.

1. Problemdefinition
2. Requirementspecification
3. System design details (UMLdiagrams)
4. System implementation – code documentation – dataflow diagrams/ algorithm, protocolsused.
5. Test result andprocedure
6. Conclusions.
7. Appendix a. Tools used b. References c. Basepapers.

TOTAL HOURS: 300

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16CYP03 **COMPREHENSION** **L T PC**
0 021

COURSE OBJECTIVES

1. To write effective and coherentparagraphs
2. Tocomprehendtheoveralland internal organizationofanacademicessay
3. To write an effective thesisstatement
4. To use pre-writing strategies to planwriting
5. ToProducecoherentandunifiedparagraphswithadequatesupportand detail ofthetopic

COURSE OUTCOMES

1. Write a paragraph with a topic sentence, support, andconcludingsentence
2. Writeaneffectiveintroductionthesisstatementthataddressesthewritingpromptandconclusion
3. Produceawell-organizedacademicessayanduseavarietyofaccuratesentencestructures
4. Produce appropriate vocabulary and correctwordforms
5. Produce accurate grammatical structures for the paragraphwriting

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYP03.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP03.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP03.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP03.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP03.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

COMPREHENSION TOPICS:

1. Cloud Computing for SmallBusinesses
2. Role of Information Technology in CorporateFunctions
3. KnowledgeManagement
4. The Impact of CloudComputing
5. Clustercomputing
6. Computer Forensics
7. The Internet ofThings
8. DataSecurity
9. GreenComputing
10. Issue on eGovernment Development and Applications
11. BigData
12. Design of Reversible ComputingSystems
13. SocialPlatforms

TOTAL HOURS: 30

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19CYP04 **TECHNICALSEMINAR** **L T P C**
0 4 0 2

COURSE OBJECTIVES

1. Toexposestudentstothe'real'workingenvironmentandgetacquaintedwiththeorganizationstructure, Business operations and administrativefunctions
2. To promote and develop presentation skills and import a knowledgeablesociety
3. Toset thestageforfuturerecruitmentbypotentialemployers
4. To develop the presentation skill foremployability
5. To Utilize available technical resources inefficientmanner

COURSE OUTCOMES

1. Develop a skill for work in actualworkingenvironment.
2. Utilizeavailabletechnicalresourcesinefficientmanner.
3. Writetechnicaldocumentsandgiveoral presentationsrelatedtotheworkcompleted.
4. PrepareapresentationinlatesttrendsinInformationTechnology.
5. ImplementthepresentationinlatesttrendsinInformationTechnology

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYP04.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP04.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP04.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP04.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP04.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

Seminar Topic:

Seminar topic should relate to the Information Technology, Some of the seminar topics are listed below:

1. FreeNet
2. Linear Programming inCloud
3. BlackberryTechnology
4. Biometric SecuritySystems
5. Credit Card FraudDetection
6. Vehicle ManagementSystem
7. SmartshaderTechnology
8. DigitalPiracy
9. GoogleGlass
10. DataRecovery
11. Cyber and SocialTerrorism
12. SpaceMouse
13. PillCamera
14. AmbientIntelligence
15. Mind ReadingComputer
16. Honeypots
17. Security throughObscurity
18. ElectronicBanking
19. Gi-Fi

Scheme of Evaluation:

The Course is evaluated based on:

- Presentation
- Student'sreports
- PPTpresentation
- Presentationwilltakeplacein theweeklyclass.Thepresentationisevaluationbyyourclassincharge.
- Reportmustbesubmitteddurингpresentation.Thereportevaluationisdonebyyourclassincharge.
- A Viva voce comprising comprehensive questions basedon thepresentation.

TOTAL HOURS: 60

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19CYP05 ENTREPRENEURSHIPDEVELOPMENT L T PC

30 03

COURSE OBJECTIVES

1. Topromotestrongentrepreneurshipamong Engineers,Managersand Sciencestudents.
2. Topromoteentrepreneurshipamongrelevantsectorsinthestate.
3. To collaborate with other organizationsandinstitutions.
4. To organize entrepreneurship development and awarenessprograms.
5. Toundertakeresearchstudiestoidentifyhightechnologyareashavingentrepreneurshipopportunities.

COURSE OUTCOMES

1. Identifyingrealproblemsand asolutionspeoplewantpitchingsolutions,suchasproductsandservices.
2. Achievehighdegreeofproductivityinasmallteamviaagile,highqualitypracticesand team organizationapproaches
3. Create a production softwaredevelopmentenvironment.
4. Preparelandscapeandapproachesforattractinginvestorsandsecuringfunding Communicating withcustomer
5. Achievecustomersatisfactioninthedevelopmentof ITproductsandservices

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYP05.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP05.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP05.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP05.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19CYP05.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNITI **9**

CONCEPT OF ENTREPRENEURSHIP: Meaning and characteristics of entrepreneurship, entrepreneurial culture, socio-economic origin of entrepreneurship, factors affecting entrepreneurship, conceptual model of entrepreneurship, traits of a good entrepreneur, entrepreneur, intra-preneur and manager ENTREPRENEURIAL MOTIVATION: motivating, compelling and facilitating factors, entrepreneurial ambition, achievement motivation theory and Kakinada experiment

UNITII **9**

ESTABLISHMENTOFENTREPRENEURIALSYSTEMS:search,processingandselectionofidea,Input requirements SMALL SCALE INDUSTRY: meaning, importance, characteristics, advantagesand problems of SSIs. Steps for starting a small industry, guidelines for project report, registration asSSI.

UNITIII **9**

ASSISTANCE TO SSI: need for incentives & subsidies, need for institutional support, role of government and other institutions.

UNITIV **9**

FUNCTIONALPLANS:Marketingplan-marketingresearchforthenewventure, stepsinpreparingmarketing plan, contingency planning; Organizational plan- Forms of ownership, designing organizational structure, job design, manpower planning; Financial plan- cash budget, working capital, proforma income statement, Proforma cash flow, proforma balance sheet, break evenanalysis.

UNITV **9**

SOURCES OF FINANCE: Debt or Equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs; legal issues- intellectual property rights, patents, trademarks, copy rights, trade secrets, licensing, franchising.

TOTAL HOURS: 45

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TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gupta C. B. and Srinivasan N. P	Entrepreneurial Development	Sultan Chand & Sons	2014
2.	Vasant Desai	Management of a Small Scale Industry	Himalaya Publishing House	2011

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Sangeetha Sharma	Entrepreneurship Development	PHI Learning Pvt. Ltd	2016
2	K Ramachandran	Entrepreneurship Development	Tata McGraw-Hill	2009
3	Abhishek Nirjar	Entrepreneurship Development	CBS Publishers	2014
4	S. Anil Kumar	Entrepreneurship Development	New Age International	2008
5	Fang Zhao	Information Technology Entrepreneurship and Innovation	O'Reilly	2008

WEB URLs

1. https://www.tutorialspoint.com/entrepreneurship_development/index.htm
2. https://www.entrepreneur.com/article/244279
3. https://ocw.mit.edu/courses/entrepreneurship/
4. http://freevideolectures.com/Course/3645/Technology-Entrepreneurship
5. http://articles.bplans.com/11-excellent-free-online-courses-for-entrepreneurs

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19CYP06 **PROFESSIONALPRACTICES** **L T P C**
0 0 6 3

COURSE OBJECTIVES

1. Toexamineimportantprofessionalissuesincontemporarypracticeandtohelpstudentsbecomean effective participant in a team of ITprofessionals.
2. Tohavegainedathoroughunderstandingofthevariousissues/factorsanIT professionalfacesandhow one shouldrespond.
3. To have learned what are considered professional behavior in the ITfield
4. To have learned about the currentITpractices.
5. To Develop professional attitude from the perspectives of experienced ITpractitioners

COURSE OUTCOMES

1. Describethevariousissues/factorsaninformationtechnologyprofessional
2. Describe professional behavior in the informationtechnology.
3. Recognizewhatarethecurrentissuesin ITandtheemergingtechnology
4. Write properly formatted and organized technicalreports
5. Acquireandintegrateknowledgetoappreciateindustrypractices

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19CYP06.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP06.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP06.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP06.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19CYP06.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

CONTENT:

1. **Discipline-specificknowledgeandcapabilities**:appropriatetothelevelofstudyrelatedtoanInformation Technologyprofession.
2. **Communication**:usingoral,writtenandinterpersonalcommunicationtoinform,motivateandeffect change
3. **Digitalliteracy**:usingtechnologiestofind,useanddisseminateinformation
4. **Criticalthinking**:evaluatinginformationusingcriticalandanalyticalthinkingandjudgment
5. **Problemsolving**:creatingsolutionstoauthentic(realworldandill-defined)problems
6. **Self-management:** working and learning independently, and taking responsibility for personalactions.
7. **Teamwork**:workingandlearningwithothersfromdifferentdisciplinesandbackgrounds
8. **Globalcitizenship**:engagingethicallyandproductivelyintheprofessionalcontextandwithdiverse communities and cultures in a globalcontext

I. Information TechnologyProfessionalism

A. Privacy andconfidentiality
B. Computerethics
C. Intellectual propertyissues
D. Computer crime andfraud
E. Professionalbodies
F. Impact of information technology onsociety

II. Information TechnologyPractices

A. Effects ofstandardization
B. Effectiveness vsefficiency
C. Distributed systemsissues
D. Emergingtechnologies
E. Qualityissues
F. Currentissues

TOTAL HOURS: 90

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TEXT BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Schultz, Robert A	Contemporary Issues in Ethics and Information Technology	IRM Press	2006
2.	Baase S	A Gift of Fire, Social, Legal and Ethical Issues for Computers and the Internet	Prentice Hall	2003

REFERENCE BOOKS:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Johnson DG	Computer Ethics	Prentice Hall	2001
2	Spinello RA	CyberEthics: Morality and Law in Cyberspace	Jones and Bartlett	2000

WEB URLs

1. www.infosec.gov.hk
2. www.pcpd.org.hk
3. www.ipd.gov.hk
4. www.ogcio.gov.hk
5. www.hkcs.org.h

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OPEN ELECTIVE COURSES (OEC)

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19MEE07 **INDUSTRIAL AUTOMATION & ROBOTICS** **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To learn the levels of automation and production economics
- To impart the knowledge on Material handling and Identification Technologies.
- To know the Automated Assembly Systems.
- To impart clear knowledge about the techniques and applications of Automation and Robotics Programming in an industrial environment.
- To understand robotic systems and apply what they learned to a career in the Automation and Robotics field.

COURSE OUTCOMES

- Understand levels of automation and production economics.
- Understand the Material handling and Identification Technologies.
- Explain the Automated Assembly Systems.
- Understand the techniques and applications of Automation and Robotics Programming in an industrial environment.
- Design and implement robotic systems and apply what they learned to a career in the Automation and Robotics field.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MEE07.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19MEE07.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19MEE07.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19MEE07.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19MEE07.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I: INTRODUCTION 9

Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System,
Advanced Automation Functions, Levels of Automations. Production Economics: Methods of Evaluating Investment
Alternatives, Costs in Manufacturing, Break Even Analysis, Unit cost of production, Cost of Manufacturing Lead time and Work-in-process.

UNIT II: MATERIAL HANDLING AND IDENTIFICATION TECHNOLOGIES 9

The material handling function, Types of Material Handling Equipment, Analysis for Material Handling Systems, Design of the System, Conveyor Systems, Automated Guided Vehicle Systems. Automated Storage Systems: Storage System Performance, Automated Storage/Retrieval Systems, Work-in-process Storage, Interfacing Handling and Storage with Manufacturing. Product identification system: Barcode, RFID etc.

UNIT III: AUTOMATED ASSEMBLY SYSTEMS 9

Design for Automated Assembly, Types of Automated Assembly Systems, Part Feeding Devices, Analysis of Multi-station Assembly Machines, Analysis of a Single Station Assembly Machine.

UNIT IV: FUNDAMENTALS OF ROBOT AND END EFFECTORS 9

Robot - Definition - Robot Anatomy - Co ordinate Systems, Work Envelope Types and Classification-Specifications-Pitch,Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications. End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers,Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT V: ROBOT KINEMATICS AND ROBOT PROGRAMMING 9

Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Velocity and Forces-Manipulator Dynamics, Trajectory Generator. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

TOTAL = 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	M.P.Grover	Automation, Production Systems and Computer IntegratedManufacturing	Pearson Education	2015
2	Krishna Kant	Computer Based Industrial Control	EEE-PHI	2017

REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Tiess Chiu Chang & Richard A. Wysk	An Introduction to Automated Process Planning Systems	PHI	1985
2	Amber G.H & P.S. Amber	Anatomy of Automation	Prentice Hall	2009
3	S.R. Deb	Robotics Technology and flexible automation	Tata McGraw-Hill Education	2009

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19MEE18 POWERPLANTENGINEERING **L T PC**

3 0 0 3

COURSE OBJECTIVES

1. ToprovideanoverviewofPowerPlantsand detailingtheroleofMechanicalEngineersintheir operation and maintenance.
2. To understand about Thermal power plants andworking
3. To know about Diesel engine power plants andworking
4. To know the working of Nuclear power plants and other powerplants
5. To understand Environmental problems related to powerplants

COURSE OUTCOMES

1. Comprehend the working principles of coal based thermal powerplants
2. Illustrate the working principles of diesel, gas turbine and combined cycle powerplants
3. Illustrate and explain the working principle and components of nuclear powerplants
4. Explain the techniques to extract power from renewable energysources
5. Understand the economic and environmental issues of powerplants.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MEE18.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19MEE18.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19MEE18.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19MEE18.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19MEE18.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

UNIT I: COAL BASED THERMALPOWER PLANTS 9

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogenerationsystems.

UNIT II: DIESEL, GAS TURBINE AND COMBINED CYCLEPOWER PLANTS 9

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT III: NUCLEARPOWER PLANTS 9

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANada Deuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measuresfor Nuclear Power plants.

UNIT IV: POWER FROMRENEWABLEENERGY 9

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, *Solar* Photo Voltaic (SPV), SolarThermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V: ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OFPOWER PLANTS 9

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria,relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TOTAL: 45

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TEXT BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Nag. P.K.,	Power Plant Engineering	Tata McGraw – Hill	2010
2	C. Elanchezhian, L. Saravanakumar,B. Vijaya Ramnath	Power Plant Engineering	I.K.International Publishing house pvt ltd	2007

REFERENCE BOOKS:

1.	El-Wakil. M.M	Power Plant Technology	Tata McGraw – Hill Publishing Company Ltd.,	2010
2.	Thomas C. Elliott	Power Plant Engineering	Standard Handbook of McGraw – Hill	2003
3.	Godfrey Boyle	Renewable energy	Oxford University Press	2004
4	R.K.Rajput	Power Plant Engineering	Laxmi Publications	2016
5	S. C. Arora and S. Domkundwar	A COURSE in Power Plant Engineering	Dhanpatrai & Sons,	2008

WEB URLs

1. www.youtube.com/watch?v=IdPTuwKEfmA
2. www.youtube.com/watch?v=Uhjhufhg3Xk
3. www.youtube.com/watch?v=9q7_n2E32_g
4. www.youtube.com/watch?v=riRzpm0u81I
5. www.youtube.com/watch?v=hrFeyue--g

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19MEC26 **TOTALQUALITYMANAGEMENT** **L T PC**
3 0 03

COURSE OBJECTIVES

1. TounderstandtheTotalQualityManagementconceptandprinciplesandthevarioustoolsavailabletoachieve Total QualityManagement
2. To understand the application of statistical approach for qualitycontrol
3. To create an awareness about the ISO and QS certification process and its need for theindustries
4. To apply the quality concepts in product design, manufacturing etc in order to maximize customerSatisfaction
5. Human involvement to improve quality and the development andtransformation

COURSE OUTCOMES

1. Understand the concept of total qualitymanagement
2. Comprehend and illustrate the TQMprinciples
3. Solve quality related problems using statistical processcontrol
4. Understand proven methodologies to enhance managementprocesses
5. Illustrate the salient features of qualitysystems

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19MEC26.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19MEC26.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19MEC26.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19MEC26.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19MEC26.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I:INTRODUCTION

9

Definition of Quality – Dimensions of Quality – Quality Planning – Quality costs – Analysis Techniques for Quality Costs – Basic concepts of Total Quality Management – Historical Review – Quality Statements – Strategic Planning, Deming Philosophy – Crosby philosophy – Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen-Obstacles to TQMImplementation

UNIT II:TQMPRINCIPLES

9

Principles of TQM, Leadership – Concepts – Role of Senior Management – Quality Council, Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits– Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure

UNIT III: STATISTICAL PROCESSCONTROL(SPC)

9

The seven tools of quality – Statistical Fundamentals – Measures of central Tendency and Dispersion,Population and Sample, Normal Curve, Control Charts for variables X bar and R chart and attributes P, nP, C, and u charts, Industrial Examples, Process capability, Concept of six sigma – New seven Management tools

UNIT IV:TQMTOOLS

9

Benchmarking – Reasons to Benchmark – Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, and Benefits – Taguchi Quality Loss Function – Total Productive Maintenance (TPM) – Concept, Improvement Needs, and FMEA – Stages of FMEA- Casestudies

UNIT V:QUALITYSYSTEMS

9

Need for ISO 9000 and Other Quality Systems – ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO 9000:2005 (definitions), ISO 9001:2008 (requirements) and ISO 9004:2009 (continuous improvement), TS 16949, ISO 14000, AS9100 – Concept, Requirements and Benefits- Case studies

Total:L: 45

TEXT BOOKS:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dale H. Besterfiled	Total Quality Management	Pearson Education Inc, New Delhi	2003
2.	James R. Evans and William M. Lidsay,	The Management and Control of Quality	South-Western	2002

REFERENCE BOOKS:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	N. Gupta and B. Valarmathi,	Total Quality Management	Tata McGraw-Hill Publishing Company Pvt Ltd., New Delhi	2009
2	Dr S. Kumar	Total Quality Management,	Laxmi Publications Ltd., New Delhi	2006
3	P. N. Muherjee	Total Quality Management	Prentice Hall of India, New Delhi	2006
4	James R. Evans and William M. Lindsay	The Management and Control of Quality	8th Edition, First Indian Edition, Cengage Learning	2012
5	Suganthi.L and Anand Samuel	Total Quality Management	Prentice Hall (India) Pvt. Ltd	2006

WEB URLs

1. www.nptel.iitm.ac.in/COURSEs/WebCOURSE-contents/IIT-roorkee/industrialengineering/index.htm
2. www.statit.com/services/SPCOverview_mfg.pdf
3. www.3.ha.org.hk/qeh/wiser/doc/7bqt.pdf
4. www.directory.umm.ac.id/Data%20Elmu/pdf/TQMTools.pdf
5. www.pqm-online.com/assets/files/lib/books/holye2.pdf

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19ECE06TELECOMMUNICATIONSWITCHINGNETWORKS LTPC 3 0 03

COURSE OBJECTIVES

1. To introduce fundamentals functions of a telecom switchingSystems
2. To provide statistical modeling of telephone traffic and characteristics of blocking and queuingsystem
3. To learn the various switchingnetworks
4. To introduce the concepts of Digital SwitchingSystems
5. To study signaling, packet switching andnetworks.

COURSE OUTCOMES

1. Describe the Basic Switching concepts oftelecommunication.
2. Analyze and evaluate fundamental telecommunication trafficmodels
3. Solve problems in switching networks
4. Understand the concepts of Digitalswitching
5. Understand the signaling and packet switchingtechniques

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19ECE06.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19ECE06.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19ECE06.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19ECE06.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19ECE06.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

UNIT ISWITCHINGSYSTEMS 9

Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-Point Technology; Crossbar Exchange Organization; A General Trunking; Electronic Switching; Digital Switching Systems.

UNIT IITRAFFICENGINEERING 9

Congestion – Network traffic load and Parameters – Traffic measurement – Lost-call system – Grade of Service and Blocking probability – Modeling switching systems – Incoming traffic and service time characterization – Blocking models and loss estimates – Queuing systems – Simulationmodels.

UNIT III SWITCHINGNETWORKS 9

Single Stage Networks; Gradings-Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks – Gradings – Link systems – Grades of service of link systems – Application of graph theory to link systems – Use of expansion – Call packing – Rearrangeable networks – Strict-sense non-blocking networks –Sectionalized switching networks.

UNIT IV DIGITAL SWITCHING SYSTEMS 9

Space and time switching – Time-division switching networks – Grades of service of time-division switching networks-– hybrid time and space division multiplexes – Non-blocking networks – Synchronization – Call-processing functions – Common control – Reliability, availability and security – Stored program control.

UNIT V SIGNALING AND PACKET SWITCHING 9

Customer line signaling – FDM carrier systems – PCM signaling – Inter-register signaling – Common-channel signaling principles – CCITT signaling – Digital customer line signaling – Statistical multiplexing – Local area and wide area networks – Large scale and Broadbandnetworks.

Total:45 Hrs

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TEXT BOOKS

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Thiagarajan Viswanathan	elecommunication Switching Systems and Networks	Prentice Hall of India Pvt.Ltd	2006
2.	William Stallings	ireless Communication and Networks	Pearson Education, New Delhi	Second edition 2004

REFERENCE BOOKS

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	J.E. . Flood	Telecommunications Switching, Traffic and Networks	Pearson Education Ltd	2006
2.	John C Bellamy	Digital Telephony	John Wiley	3rd Edition, 200(
3.	Behrouz Forouzan	Introduction to Data Communication and Networking	Tata Mc-Graw Hill New York	1996
4.	Tomasi	Introduction to Data Communication and Networking	Pearson Education	1st Edition, 200
5.	R.A.Thomson	Telephone switching Systems	Artech House Publishers	2000

WEB URLs

1. www.nptel.ac.in/courses/117104128/12
2. wwwnptel.ac.in/courses/106105082/20
3. wwwnptel.ac.in/courses/117104104/
4. wwwnptel.ac.in/courses/117101050/25
5. wwwnptel.ac.in/courses/106105080/pdf/M4L1.pdf

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19ECE08 **MOBILEAD-HOCNETWORKS** **L T PC**
3 0 03

COURSE OBJECTIVES

1. To gain knowledge in wireless network protocol and standards.
2. To study the MAC, Routing protocols for ad hocnetworks.
3. To gain knowledge about NetworkSimulator.
4. To learn the concept of security mechanism for wirelessnetworks.
5. To study about Characteristics of securityprotocols.

COURSE OUTCOMES

1. Demonstratethecurrentad-hoc/sensortechnologiesbyresearchingkeyareassuchas algorithms, protocols andapplications
2. Identify the major issues associated with ad-hoc/sensor networks and supporting software inadhoc/sensor networks.
3. Create a wireless network scenario and analyze its performance using networksimulator
4. Choose security component for five layers ofnetworks
5. Analyze the characteristics of different securityprotocols

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19ECE08.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19ECE08.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19ECE08.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19ECE08.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19ECE08.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I INTRODUCTION 9

Introduction to Ad-Hoc wireless networks- Packet radio networks-Key definitions of ad-hoc and sensor networks- Advantages of ad-hoc and sensor networks -Unique constraints and challenges and Vulnerabilities- Wireless Communications/Radio Characteristics. Applications of Ad-Hoc/Sensor Network and Future Directions: Driving Applications- Ultra wide band radio communication- Wireless fidelity systems-optical wireless networks - Simulation of Wi-Fi using QUALNET simulator.

UNIT II MEDIA ACCESS CONTROL(MAC)PROTOCOLS 9

Issues in designing MAC protocols-Bandwidth efficiency-Quality of service support-Synchronization hidden node-exposed node problems. Classifications of MAC protocols: Contention based protocols-MACAW- Media access protocol for wireless LAN-media access with reduced handshake- contention based with reservation mechanisms- Distributed priority-scheduling. Mac protocols using directional antenna. Simulation of 802.11using QUALNET

UNIT III ROUTINGPROTOCOLS 9

Issues in designing routing protocols-Mobility-bandwidth constraint-Table driven routing protocols :DSDV,WRP,
CHGSRP, - On demand routing protocol : AODV,DSR, TORA,LAR,ANODR- zone routing protocol-Fish eye
state routing protocol-power aware routing protocol. Simulation of routing protocols using QUALNET simulator.

UNIT IV WIRELESS SENSOR NETWORKS 9

Introduction-sensor network architecture-Data dissemination-data gathering-self organizing, MAC Protocols for Sensor Networks - Location discovery- Quality of a Sensor Network - Evolving Standards - Energy efficient issues- Transport layer. Synchronizationissues.

UNIT V SECURITY ISSUES IN AD HOC /SENSOR NETWORK 9

Introduction -Need for Security- classification of attack-MAC layer attacks-Network layer attacks-Wired Equivalent Privacy(WEP)-Intrusion prevention scheme- Confidentiality : Symmetric Encryption- DES and Triple DES detection systems- Authentication :Digital Signatures, Certificates, User Authentication, Elliptic Curve Cryptosystems. Intrusion detection systems : behavior based detection knowledge based detection-watch dog-path rater. Reputation based system: CORE, CONFIDENT

Total: 45

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TEXT BOOKS

Sl.N.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Siva Ram Murthy C. and Manoj B S,	Ad Hoc Wireless Networks: Architectures and Protocols	Prentice Hall,	2014.
2.	Toh C K,	Ad Hoc Mobile Wireless Networks: Protocols and Systems	Prentice Hall	2008

REFERENCE BOOKS

Sl.N.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Charles Perkins, Addision Wesley,	Ad hoc Networking	Pearson	2008
2.	Toh C.K,	Ad Hoc Mobile wireless Networks : protocol and Systems	Prentice Hall PTR,	2008
3.	Feng zhao, Leonidas Guibas	Wireless sensor network,	Morgan Kaufmann publishers,	2015
4.	Kazem sohraby, Daniel minoli and Taieb Znati,	Wireless sensor networks- Technology, Protocols and Applications	Wiley	2007
5.	T.L.Singhal	Wireless Communication	TMH,	2012

WEB URLs

1. www.onlinecourses.nptel.ac.in/noc17_cs07
2. www.nptel.ac.in/courses/106105160/3
3. www.nptel.ac.in/courses/106105080/pdf/M5L7.pdf
4. www.ece.rochester.edu/courses/ECE586/lectures/MANETS_MAC.pdf
5. www.onlinecourses.nptel.ac.in/noc17_cs07/announcements

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19PC-CED11 **WATERSUPPLYENGINEERING** **L T PC**
3 0 03

COURSE OBJECTIVE

1. To make the students conversant with sources, demand and characteristics ofwater
2. To expose the students to understand the concept of various water supplylines.
3. To provide adequate knowledge about the water treatmentprocesses.
4. To prefer the suitable advanced treatmenttechniques.
5. To provide knowledge on water distribution and plumbing system

COURSE OUTCOMES

At the end of the course the student will be able to

1. Identify the quantity and quality of water from varioussources.
2. Explain the processes involved in the water conveyancesystems
3. Infer the design principles of unit operations and unit processes for watertreatment
4. Justify the suitable advanced treatment techniques for watertreatment
5. Choose the appropriate water distribution network for a city and plumbing systems for abuilding

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19PC-CED11.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19PC-CED11.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19PC-CED11.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19PC-CED11.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-
19PC-CED11.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	X	-

UNIT I PLANNING FOR WATERSUPPLY SYSTEM 9

Public water supply system - Planning - Objectives -Design period - Population forecasting -Water demand -Sources of water and their characteristics - Surface and Groundwater- Impounding Reservoir - Development and selection of source-Water quality - Characterization andstandards.

UNIT IICONVEYANCE SYSTEM 9

Water supply -intake structures -Functions and drawings -Pipes and conduits for water- Pipe materials - Hydraulics of flow in pipes -Transmission main design -Laying, jointing and testing of pipes - Drawings appurtenances - Types and capacity of pumps -Selection of pumps and pipe materials.

UNIT IIIWATERTREATMENT 9

Objectives - Unit operations and processes - Principles, functions design and drawing of chemical feeding, Flash mixers, flocculators, sedimentation tanks and sand filters - Disinfection- Residue Management - Construction and Operation & Maintenance aspects of Water Treatment Plants.

UNIT IV ADVANCEDWATER TREATMENT 9

Principles and functions of Aeration - Iron and manganese removal, Defluoridation and demineralization - Water softening - Desalination - Membrane Systems - Recent advances.

UNITV WATER DISTRIBUTION AND SUPPLYTOBUILDINGS 9

Requirements of water distribution -Components -Service reservoirs - Functions and drawings - Network design - Analysis of distribution networks - Appurtenances -operation and maintenance -Leak detection, Methods. Principles of design of water supply in buildings -House service connection -Fixtures and fittings -Systems of plumbing and drawings of types of plumbing.

TOTAL: 45

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TEXT BOOKS:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S.K. Garg	Water Supply Engineering	Khanna Publications Pvt.Ltd. New Delhi.	2010
2	Modi, P.N	Environmental Engineering I	Standard Book House, Delhi	2015

REFERENCE BOOKS:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Cpheeco Manual	Manual on Water supply and Treatment	Government of india, New Delhi	2016
2	Birdie.G	Water Supply and Sanitary Engineering	Dhanpat Rai and sons	2011
3	Syed R Qasim, Motley E M	Water Works Engineering – Planning, Design and Operation	Prentice- hall of India, New Delhi,	2013
4	Babbit. H. E., and Donald. J. J	Water Supply Engineering	McGraw Hill book Co	2012

WEB URLs

1. www.ircwash.org/sites/default/files/202.6-89ES-3959.pdf
2. www.sswm.info/content/water-distribution-pipes
3. www.who.int/water_sanitation_health/dwq/S12.pdf
4. www.sswm.info/print/2820?tid=1257
5. www.sswm.info/content/water-distribution-pipes

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19PE-CEE05 **HEALTH MONITORINGOFSTRUCTURES** **LTPC**
30 03

COURSE OBJECTIVES

1. To Study about maintenance and repair ofstructure
2. To impart the quality and durability ofconcrete
3. To Study about special materials for repair ofstructures.
4. To learn about repair and demolitiontechnique.
5. To gain the knowledge about rehabilitation and strengthening ofstructures.

COURSE OUTCOMES

At the end of the course the student will able to,

1. Obtain the knowledge of maintenance and repair ofstructures.
2. Obtain the knowledge serviceability and durability ofconcrete
3. Select suitable material for repair.
4. Select appropriate techniques for repair anddemolition
5. Know about repair, rehabilitation and strengthening ofstructures.

Course Outcomes	Program Outcomes												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19PE-CEE05.CO1	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19PE-CEE05.CO2	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19PE-CEE05.CO3	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19PE-CEE05.CO4	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-
19PE-CEE05.CO5	X	X	X	X	-	-	-	-	-	-	X	X	X	-	-

UNIT I MAINTENANCE ANDREPAIRSTRATEGIES 9

Maintenance, repair and rehabilitation - Facts of Maintenance - importance of Maintenance various aspects of Inspection-Assessment procedure for evaluating a damaged structure - causes of deterioration - Diagnosis of causesand preventivemeasures.

UNITII SERVICEABILITY AND DURABILITYOFCONCRETE 9

Quality assurance for concrete construction concrete properties - strength, permeability, thermal properties and cracking - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking.

UNIT III SPECIAL MATERIALSFOR REPAIR 9

Special concretes and mortar - concrete chemicals - special elements for accelerated strength gain - Expansive cement - polymer concrete - sulphur infiltrated concrete - ferro cement - Fibre reinforced concrete.

UNITIV TECHNIQUES FOR REPAIRANDDEMOLITION 9

Rust eliminators and polymers coating for rebars during repair - foamed concrete - mortar and dry pack - vacuum concrete - Gunite and Shotcrete - Epoxy injection - Mortar repair for cracks - shoring and underpinning - Methods of corrosion protection - corrosion inhibitors - coating and cathodic protection - Engineered demolition techniques for Dilapildated structures - case studies.

UNIT V REPAIRS, REHABILITATION & STRENGTHENINGOFSTRUCTURES 9

Repairs to overcome low member strength - Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure - Strengthening of Super Structures - plating - Conversion tocomposite constructionpost stressing - Jacketing - Reinforcement addition, strengthening the substructures - Increasing the load capacity of footing.

TOTAL : 45

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TEXT BOOKS:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Denison Campbell, Allen and Harold Roper	Concrete Structures, Materials, Maintenance and Repair	Longman Scientific and Technical UK	2006
2.	R.T.Allen and S.C.Edwards	Repair of Concrete structures	Blakie and Sons, UK	2007

REFERENCE BOOKS:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dr.B Vidivelli	Rehabilitation of Concrete Structures	Standard Publishers Distributors	2013
2.	M.S.Shetty	Concrete Technology -Theory and Practice	S.Chand and Company, New Delhi	2006
3.	M.L. Gambhir	Concrete Technology	Tata McGraw Hill Company, Noida	2011
4.	Santhakumar, A.R	Training Course notes on Damage Assessment and repairs in Low Cost Housing,"RHDC–NBO"	Anna University	1995
5.	Lakshmipathy, M	Lecture notes of Workshop on "Repairs and Rehabilitation of Structures"	-	1999

WEB URLs

1. www.youtube.com/watch?v=fikRPFpbgVo
2. www.brainkart.com/.../Important-Questions-and-Answers--Serviceability-and-Durabil...
3. www.iitk.ac.in/nicee/wcee/article/11_2089.PDF
4. www.brainkart.com/.../Important-Questions-and-Answers--Techniques-for-Repair-an...
5. www.ijiert.org/download-file?file=1490447458_Volume%204%20Issue%203...

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